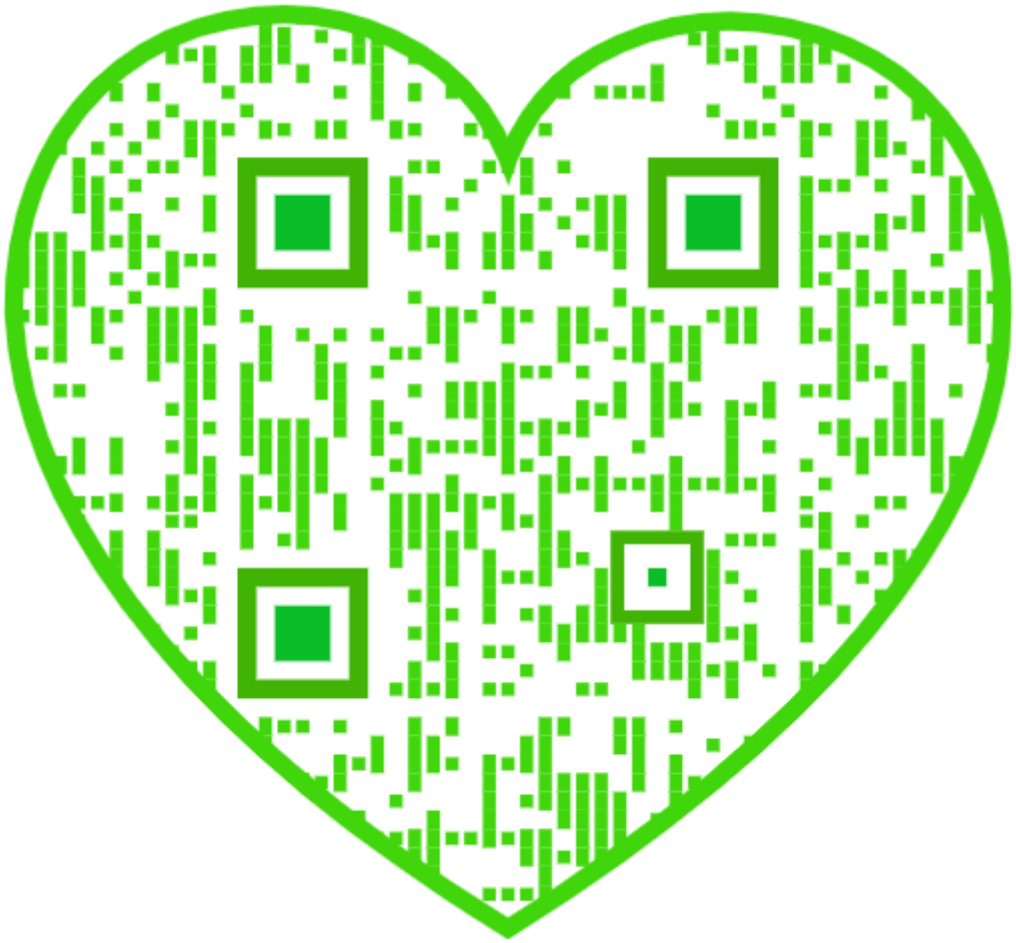

NOTES

ON

OBSTETRICS

By

JOSEPH B. DE LEE

Professor of Obstetrics

For the Junior and Senior Classes.

Northwestern University Medical School.

LIBRARY

Original Edition 1904
Republished 1906 and 1909

PRESS OF
KENFIELD-LEACH CO.
CHICAGO

Copyright 1904,
Joseph B. De Lee

LANE LIBRARY

W
II 84
1904

PREFACE

The reader is requested to remember that this is not a treatise, but a volume of notes from the obstetric lectures of Dr. De Lee, given to the Junior and Senior classes of the Northwestern University Medical School. The essentials of the science and art are thoroughly considered, and the book is intended for the class work of the students in the two years' course of instruction in midwifery. The author has sought to establish at the Northwestern, a School of Obstetrics whose principles and thought should guide the young practitioner in the first years of his practice or until he is capable, with safety to his patients, of thinking and acting for himself. This school of obstetric thought and practice is founded on the teachings of the late Dr. William Wright Jaggard, who occupied the chair of Obstetrics before the author; upon the teachings of the leading accoucheurs of Vienna, Berlin and Paris, and upon his own experience in dispensary, hospital and private practice. To accomplish this purpose, the work of the whole teaching department, including the Chicago Lying-in Hospital and Dispensary, is intimately correlated and developed in these Obstetric Notes. Uniformity of teaching and practice is thus assured and the student goes forth with a clear, rounded and definite knowledge of the art. A certain degree of dogmatism is unavoidable in attaining this end, but the student, becoming a practitioner, will soon find the flaws, if any, in these precepts, and will avoid them, while in the meantime his patients will not have been suffering from his lack of, or his desultory understanding of, the art.

The author invites correspondence on such subjects, as his students find, in practice, to be at variance with his teachings.

While these notes are to be used as a text-book, the student is urged to do as much collateral reading in standard treatises on obstetrics as possible. A book written by the author, entitled "Obstetrics for Nurses," will give the student much information in the details of actual obstetric practice.

In these notes, smoothness of diction has, in many places, been sacrificed for brevity and terseness of expression.

34 Washington St.,
October 1st, 1904.

JOSEPH B. DE LEE.

JUNIOR NOTES.

NOTES ON OBSTETRICS

JUNIOR NOTES

At birth a girl and a boy baby are very much alike. The boy weighs one-fourth to one-half of a pound more; the head is a little larger, absolutely and relatively to the body. More boys are born than girls, 106 to 100, but more boys die during labor, because of their greater size, and more die during the first years of life. In the first year there is a change in the sexes and after the child walks one can easily tell the boy or girl.

Sexually the boy and the girl are about alike up to the age of nine or ten, when they begin to change. This is most marked at the time of Puberty.

Puberty may be defined as that period where the individual becomes capable of reproduction. In females puberty begins between the thirteenth and fifteenth years; in males the fourteenth and seventeenth years. The changes are more rapid and marked in the female, and are both physical and psychical. The pelvis enlarges, the limbs round out with fat, the breasts enlarge and become fuller, both by growth of gland and fat; sometimes fine lines or striae appear on the breasts and buttocks, purplish at first, in four or five years white and silvery. The external genitals increase in size and become covered with hair. Her general carriage changes. The thyroid enlarges, and in males the voice changes, while the sebaceous glands increase in size and activity. The mind changes in the three parts,—the will, the intellect and the emotions. The will, especially during the change, becomes uncertain and the girl loses to a good extent her control over it. Hysterical manifestations are quite common. This is also true of the emotions. The inclination toward males increases and a sense of modesty develops. This transformation is the outward expression of the changes in the internal organs of generation. The uterus is developing rapidly, the vagina lengthens and becomes rugous, the tubes enlarge, the ovaries take on especial activity, the ovaries develop and the Graafian Follicles become larger, i. e., ovulation begins.

Although the ability to reproduce begins after the beginning of puberty the girl is not yet *fit* to give birth to child. A child has been born to a girl of 9 years. Time set by Plato at twenty years. Wernich, by study of the development of the fetus, said that twenty-three is the best age for the first child. At this time also the pelvis is fully developed, the joints are not too firm, the coccyx can be pressed back, the genitals are soft and elastic.

Early marriages are not to be recommended, often the children are weak and puny, but not always. The most important sign of the advent of puberty is the appearance of the *Menses*, or *Menstruation*. This is a flow of blood of several days' duration, recurring every four weeks, attended by local symptoms referable to the genitalia, and general symptoms. This again is dependent upon, or correlated with changes going on in the ovaries, called Ovulation; so that puberty is marked by the inauguration of two new functions; *Menstruation* and *Ovulation*, each of which we will now consider. Then fertilization or conception is to be considered, after which, the relation of the three to each other.

Ovulation is that process by which an ovum ripens and is extruded from the ovary, that is, it is the maturation of the ovum or egg, and expulsion of same from the ovary.

OVULATION.

The ovary is a densely fibrous little organ situated in the pelvis on the posterior surface of the broad ligament. It is 39 m.m. long, 19 wide and 8 to 13 thick, and weighs 5 grms. Right is larger than the left and they can be felt in favorable cases bimanually. Right is less liable to disease. Shaped like a large lima bean, the flat edge being attached to the broad ligament by two layers of peritoneum, between which the vessels and nerves enter its substance. The outer edge is attached by one of the fimbriæ of the Fallopian Tube to the tube. It is covered by a layer of flattened, columnar, lustreless epithelium, called the germinal epithelium, under which is the tough Tunica Albuginea. Beneath this are small unripe ova, while deeper down are larger ova in the process of ripening. These ova are surrounded by stroma, made up of elastic fibres, yellow and white, and unstriped muscular fibres, all three most abundant at the hilus.

At the beginning of ovarian activity, the ovaries are smooth, but somewhat later they become puckered from numerous scars in their tissue. The ova, of which in a new-born girl there are thirty or forty thousand, are contained in cavities called Graafian Follicles. The development of the ova and Graafian Follicles takes place during the intrauterine life of the girl and is as follows: Between the cylindrical epithelial cells covering the ovary, lie somewhat spherical cells,

so-called "*Primordial Ova.*" The epithelium covering the ovary dips into the stroma carrying the ova along. They are called by Waldeyer, the "*Ovarian Tubes*" or "Graafian Follicle bearing cord." The upper end of the tube becomes closed while the tube is divided by the stroma into roundish cavities, each containing one, or at most two ova. These are the Graafian Follicles and are lined by the relics of the epithelium which dipped down from the surface and now form the so-called Membrana Granulosa. A fluid develops in the follicle and is called the liquor folliculi. At a certain point of the Membrana Granulosa, there is a heaping up of the cells, called the Discus Proligerus, to which the ovum is attached. The Graafian Follicle is surrounded by two layers, the Tunica Propria or vasculosa, and the Tunica Fibrosa, both from the stroma of the ovary.

The ova begins to be formed as early as the seventh month of fetal life and the full quota of ova that any female child has is probably made by the second year of its extrauterine life. Henle claimed one ovary held 36,000 ova. Waldeyer, both ovaries, 100,000; Sappey claimed there are 400,000. There are two layers of eggs; a cortical and a central; the latter are larger and reach maturity sooner.

The Graafian Follicle contains the *liquor folliculi* and the ovum which rests in the heaping of cells which is called the *Discus Proligerus.*

The function of the ovaries is to mature and discharge ova.

Ovulation is that process by which an ovum ripens and is extruded from the ovary, that is, it is maturation of the ovum or egg. They begin to ripen about the age of puberty, sometimes sooner.

When an ovum begins to ripen, the Graafian Follicle containing it sinks toward the center of the ovary and the liquor folliculi increases.

This liquid folliculi is a viscid albuminoid, clear, alkaline fluid containing oil globules and a few granules. As the fluid increases the Graafian Follicle enlarges in the direction of the surface and the covering here becomes thinner. This point finally bursts and is called the *stigma.* The Graafian Follicle may be a centimeter to 1½ centimeters large now.

The ovum is a typical cell, and consists of

1. Cells from the Discus Proligerus, or Cumulus Ovigerus, radiating and called corona radiata.
2. A Zona Pellucida, the Vitelline membrane very thin and then the yelk or vitellus, a germinal vesicle, a germinal spot, and a paranucleolus.

The Vitellus is made up of *Protoplasm, which is the active living part of the cell,* and *the deutoplasm, which is to nourish the ovum* and is a granular substance distributed through the protoplasm. It

is minute in quantity and lasts only till the ovum gets nourishment from the Fallopian Tube. Great similarity with the cell as you know it.

The Zona Pellucida corresponds to the cell wall, the vitellus corresponds to the cell contents, the germinal vesicle corresponds to the nucleus, the germinal spot corresponds to the nucleolus.

During the process of ripening of the Graafian Follicle, changes occur in the ovum itself, which prepare it for the reception of the *male* element. The nucleus undergoes a process of unequal karyokinesis, approaches the surface of the vitellus and a part of it is extruded. This is called the *first polar globule*. Then after a period of quiescence the same process is repeated, extrusion of the *second polar globule*. The germinal vesicle and germinal spot are now called the *female pronucleus*. The ovum comes to resume nearly its original form, but can now be made fertile by the male element. This process of extrusion of the polar globule is a necessary process in man and the mammalia, but some low vegetable forms of life can do without it.

There are *two theories* as to the cause of the extrusion of the polar globules. One that it is an excretion—the other, that this leaves the ovum in an incomplete state so that it needs a male element to make it fertile, and that the extrusion of same *prevents parthenogenesis*.

The Graafian Follicle has now reached its greatest size, the ovum is *1/120 of an inch in diameter*. Now the Graafian Follicle ruptures, by the thin portion becoming necrotic, *and the ovum, the discus proligerus and a little liquor folliculi are extruded*. The ovum finds its way to the tube and awaits the male element so that it may become fertilized by it and develop into a fetus.

MENSTRUATION.

This is also called the Period, Catamenia, Monthly Sickness, Cleansing, Flowers. It may be defined as a periodic flow of blood from the genitals, recurring every four weeks, accompanied by general symptoms of malaise, nervous symptoms, etc., and local symptoms of pelvic congestion. This phenomenon occurs during the normal reproductive period of women, which begins with puberty, and continues up to about forty-five years. At this age, among other changes, the periods cease and the *menopause*, the Climacteric, or the "change of life" takes place.

The menstrual flow begins as a whitish discharge, but soon becomes bloody and contains red and white blood corpuscles, degenerated, ciliated and columnar epithelium, vaginal and uterine secretions and many micro-organisms, some of them septic.

Menstruation is the most important of the outward changes which mark the advent of puberty, and the time of its occurrence is, of course, *affected* by the same conditions influencing the former. For example (1) Climate, (2) Environment, (3) Race, (4) Heredity, (5) Condition in life, (6) Type of person.

1. *Climate*, earlier in warm climate, e. g., Hindoos at twelve years. Remarkable that English women in India menstruate much earlier than usual, and some menstruate in India, but not in England, or only during the summer.
2. *Race.* Jews menstruate early. Hungarians late. Russians late.
3. *Environment.* City bred girls early. Country girls late, due to the absence of sexual stimuli in the latter.
4. *Heredity.* If mother menstruates early, children likely to do so. Can anticipate in the sisters.
5. *Condition in life.* Poor factory girl who works hard, poor food, etc., late. Girl in luxury who reads novels, plays, dances, early. Chlorotic and tuberculous girls, late; conservatism of nature.
6. *Type of Female.* Blondes, especially red-haired girls, early. Brunettes late. Jews marked exception.

Change in the uterus during menstruation, or what is the anatomical basis of menstruation?

This has been the subject of many years discussion and has not been decided as yet. We will consider the various theories advanced and later take one which is a good one to work on.

All authors agree that the uterus is congested and that the mucous membrane is thickened and softened. Whereas it has a thickness of one to two mm. between two menstruations, during the period it reaches five to seven mm. That the glands enlarge, lengthen and establish freer secretion, all concede also; ***but what part the epithelium plays is the mooted point.***

Williams believed the whole endometrium was removed down to the muscularis and that it was regenerated from the remains of the uterine glands between the muscular fibres.

Kundrat and Engelman believed that the upper layers of the mucous membrane were cast off, and a fatty degeneration occurred in them and the blood vessels, which predisposed them to rupture, and therefore, the bloody flow.

Leopold, of Dresden, believed that just the superficial layers were removed by fatty necrosis and exfoliation. Best work is by Leopold. Möricke, who curetted the uteri of women during menstruation, says no epithelium is cast off at all, as the pieces he got out showed the mucous membrane to be intact. For our part, we

will accept the following physical findings and hold to them till convinced otherwise.

This description is from Ahlfeld. The endometrium is swollen and thick. The blood vessels and lymphatic vessels are dilated so that more fluid goes to the membrane than returns from it. The uterine glands are longer, the interglandular substance increased by added cells. The intercellular substance increases, especially in the upper layers of the mucous membrane, by exudation. The mucous membrane thus thickens and this thickened membrane is called the *Decidua Menstrualis*. When the congestion and swelling reach their highest mark, numerous minute hemorrhages occur in the decidua and under it between the glands. The epithelium is raised up by these hemorrhages and necrosis occurs, the piece is cast off and the blood is allowed to ooze out; or comes directly from the capillaries. This blood mixes with the uterine and cervical mucus, loses its coagulability, takes a discolored aspect (of a light maroon), and an odor which has been compared to marigold.

The swelling of the mucous membrane gradually goes down, the epithelium which necrosed is cast off, regeneration takes place and the mucous membrane subsides into its quiescent condition. This takes about eight days. *The changes are limited to the mucous membrane of the corpus uteri.* This may be called a menstrual cycle, and happens every four weeks unless interrupted by pregnancy, lactation, or some other condition.

What is the purpose of this periodical change in the endometrium? Aveling called it "*Nest building*," and thus named the process which is now generally accepted,—that the surface is thus prepared for the reception of the fertilized egg, and is adapted for further growth of same. If the egg is not fertilized, the mucous membrane undergoes regressive changes to the normal.

How do we explain these changes? Another field where opinions differ indefinitely. It is generally conceded that there exists a relation between menstruation and reproduction. The fact that they occur together, i. e., menstrual flow and the ability to reproduce, shows that something must exist between them, or they depend on the same cause.

Bishoff finally concluded that menstruation depended on the maturation of the ovum. In other words, he said that a woman menstruates because certain changes go on in the ovary, which we term ovulation.

Theories. Pflüger said that the Graafian Follicle, by its gradual enlargement, exerted a compression of the nerves in the stroma of the ovary; this irritation of nerves was at first mild, but periodically reached an acme of intensity which caused a congestion of the blood vessels of the pelvis. That this hastened the maturation of

the ovum and the bursting of the Graafian Follicle on the one hand and on the other caused the changes in the endometrium which were described as the anatomical basis of menstruation, i. e., the swelling, exudates, etc.

Arguments for this theory, of which the essential point is that ovulation *determines menstruation* and the analogy of menstruation to heat in animals.

I. Since copulation during heat produces young, there must be ovulation at this time, and as the animal has a sort of menstruation during the heat, i. e., the genitals have bloody mucus, the comparison seems good.

II. Could feel the enlarged ovaries bimanually or could feel them in a hernia of the tube. Demonstrated the enlargement before each menstruation and ovulation.

III. *Anatomically* could demonstrate scars of ruptured follicles in the ovary post-mortem and during laparotomy. Hyrtl, case of a girl who died after eight menstruations. Four scars in each ovary.

IV. Removal of the ovaries by operation and the cessation of ovulation with cessation of menses.

V. Cases of congenital absence of the ovaries. No menses.

Arguments against this theory.

I. Leopold, at laparotomies determined that ovulation may occur between the periods at any time. Atypical and in diseased ovaries.

II. Ovulation must occur before menstruation begins, in some women, as the cases of child-birth before puberty show. "Fruit before flowers."—De la Motte.

III. Some animals, ovulation occurs long before the heat.

IV. Copulation seems to have some influence on ovulation as proved by:

a. Certain tortoises cohabit two years before eggs are fertile.
b. Copulation increases congestion in the pelvis and may hasten the bursting of a Graafian Follicle. Example of rabbit.
c. Puberty occurs earlier in the countries where child marriages are allowed.

Pflüger more recently has modified his theory to this extent, that he says the monthly ovulation is the typical one, and ovulation between periods is atypical. There is color lent to this view when one considers that the material on which Leopold based his views, were ovaries extirpated for disease.

Halban has sought to prove that the internal secretion of the ovaries causes the menstruation. In monkeys, he transplanted ovaries to distant parts of the body and the functions continued. Then removed them and the menses disappeared.

Second Theory that menstruation causes ovulation. Untenable because:

1. Ovulation precedes menstruation.
2. Women can conceive without ever having menstruated.
3. Ovulation occurs during the amenorrhea of lactation and rarely during pregnancy.

Very recently Leopold and Mironoff have suspected that the *periodicity* of ovulation may be dependent on menstruation; *i. e.*, that ovulation goes on all the time, but that every month a Graafian follicle ripens as the result of menstruation. Must now explain the periodicity of menses. There have been determined in women, as well as men, *certain waves of functions;* periodic increase of urea excretion, periodic accessions of nerve force, of spirits, of the intensity of living. On this investigation we may find the cause of ovulation and menstruation.

Third Theory, by Auvard, that both are dependent on a third cause.

1. This makes us suppose something that we know nothing about unless this periodicity before mentioned.
2. Again, we ought to have menstruation after extirpation of the ovaries as the cause must act on both.

Now, after having given types of the various hypotheses on this complicated subject, I will formulate a theory which seems most plausible to me and which is accepted by the majority of authors, which is a good working theory and will do service till a better one is proven.

By the gradual development of the Graafian Follicle, a nervous impulse is transmitted to the blood vessels of the genitals, which causes pelvic congestion. This causes the more rapid maturation of the Graafian Follicle. At the height of the congestion the Graafian Follicle ruptures. The same congestion causes the uterine mucosa to undergo the changes we learned under menstruation. The mucous membrane is thus prepared for the reception of the ovum, if it be fertilized. If the male element has access to the ovum the latter locates itself on the mucosa so prepared (or, as it is called, the Decidua Menstrualis). The egg develops into the fetus, the *Decidua Menstrualis being changed into a Decidua Graviditatis.* If the ovum is not fertilized by a male element, it passes out with the menstrual flow unnoticed and the mucosa goes back to its original condition before menstruation. *We must admit that ovulation may occur at any time, but must regard ovulation at the time of menstruation as the more common, while inter-menstrual ovulation, or that caused by copulation, is uncommon.*

Formerly many theories were held as to the reason for the phenomenon of menstruation.

1. Oldest was probably that of a general plethora. A woman was endowed with greater blood-making powers, as she must nourish the fetus also. If she remained sterile, there was no need for this extra blood and it was thus gotten rid of. While by no means accepting this theory, it is interesting to note that in poorly nourished girls, or those of a tuberculous type, nature withholds the menses for no other reason, obviously, than to save the organism this useless waste of blood.
2. A theory little less old, that of a purification. Even yet, by some races, women, while menstruating, are regarded unclean. The substances were supposed to be poisons, which were passed in the period. Recently a Southern writer said that cases of the retention of the menses could result in headache, neuralgia and rheumatic pains, even epilepsy. In Germany, the term "Monatliche Reinigung"—Monthly Cleansing, is still used.
3. Pflüger said the hemorrhage prepared the mucous membrane of the uterus for the reception of the egg. Aveling modified this, and it is so generally accepted; he called it "Nest building."
4. Power said: "A woman menstruates because she does not conceive," which goes nicely together with the latest view, for if the nest is not needed, the mucous membrane undergoes regressive changes under the clinical picture of menstruation.

Do the tubes menstruate? Reasons for believing they do:

1. Hematosalpinx.
2. Tubes fastened to the abdominal wall have regular hemorrhages.

Objections are:

1. That the tubes in both cases are pathological—and again, that in either case the blood may have regurgitated from the uterus. At our present state of knowledge, *can neither affirm nor deny tubal menstruation.*

CLINICAL ASPECTS OF MENSTRUATION.

From the time of its onset, menstruation recurs about every four weeks till the menopause. During pregnancy the flow ceases. There are some cases of menstruation during pregnancy on record, but they are rare and seldom bear investigation.

During lactation the flow often ceases. Thirty per cent of cases no menses for six months. Carl Braun found seventy per cent. where it recurred after six weeks. First menses usually profuse, and sometimes alarms patient. Sometimes after appearing a

few times, it will remain absent for a year or six months. This is not abnormal if Syphilis, Chlorosis and Tuberculosis can be eliminated.

A. *Symptoms.* At the onset of a period, the woman has symptoms referable to the genitalia, and general symptoms, called the Menstrual Molimina. There is often headache (throbbing), malaise, temperature a degree higher, pulse higher and more variable, a feeling of lassitude. There may be neuralgia in various parts of the body, especially the face, pain in the breasts and some secretion of a watery milk, perhaps breasts somewhat swollen. Chilliness may occur, dark circles form around the eyes and flashes of heat occur, face and eyes perhaps a little flushed and some irritation of the bladder noticeable. Perhaps diarrhea. Sexual desire usually increased. Remarkable that mild attacks of tonsilitis are common during that period. The thyroid often enlarges and sometimes this remains more or less permanent. Amount of urea decreased, while CO^2 increased. Emunctories generally more active and patient likely to take cold at this period. There may be light attacks of hysteria, together with an increased nervous sensibility. Sometimes an eruption on the skin, resembling Urticaria. *Locally,* External organs a little darker in color and swollen, which causes a feeling of bearing down or as if the genitals were open, backache, an increased sensibility in the iliac fossæ (ovaries). Perhaps some tympany. The genitals are congested, uterus enlarges, a somewhat temporary hypertrophy and the organ pours out an increased discharge. Cervix softened and somewhat open.

B. *Character of the flow.* At first, muco-serous, then a tinge of blood, later pure blood of a dark red, maroon color, which does not coagulate. In chlorotic girls is very watery, or the flow may be entirely colorless. It is alkaline and smells like marigold, sometimes has a very bad odor; does not coagulate because mixed with the secretions, or the blood is defibrinated by its passage. If the flow is profuse, may be clotted, which is always pathological. Quantity is four to six ounces; woman uses about four napkins daily. Counting the number of napkins used is a good way to determine if menorrhagia.

C. *Duration.* Flow lasts from four to seven days. Anglo-Saxons average three to five; French, five to seven days. At beginning of puberty, flow is moderate; after married life, becomes more profuse, first, because of irritation, and second, because of the endometritis which so frequently develops, either from childbirth or gonorrhea. Toward the menopause the flow grows smaller in amount, increased by sexual excitement, novels, good food. Said that warm climate increases the flow, but this is doubtful. Brunettes said to flow more than blondes, but often blondes flow a great deal. Generally admitted, especially by Dr. Hodge, that each woman is

a case for herself and that the best evidence of a normal flow is the effect on the woman; if she is healthy, the flow is all right.

D. *Periodicity.* Almost all women, at least seventy-one per cent, menstruate every twenty-eight days, and the majority during the new moon. A day earlier or later is of no importance. There are several types, as a twenty-eight-day type (71%), a twenty-one-day type (2%), a thirty-day type (14%), a twenty-seven-day type (1%), though some women flow every six weeks and are healthy.

The *Menopause—Change of Life—Climacteric*—takes place from the fortieth to the fiftieth years. Cases where menses continued and even conception has taken place, are recorded in forty-eighth, fifty-second, even sixty-second year (Kennedy), though these are exceptions.

From 35 to 40 years 12% cases cease to menstruate.
From 40 to 45 years 25% cases cease to menstruate.
From 45 to 50 years 50% cases cease to menstruate.
From 50 to 55 years 12% cases cease to menstruate.

Menopause occurs earlier in sterile women, earlier in cold than warm climates, earlier in the poor than in the rich, in black than in white women; so that it has the same variability as in the beginning of puberty. The periods may cease and return later (Charpentier-Parvin). Case of woman ceased at forty-eight, began at sixty and continued two years normally. These cases are suspicious of disease; cancer, fibroid. If early puberty, menopause early; late puberty, late menopause; menopause is often heralded by irregularities in the flow. Often it stops and does not reappear; sometimes a discharge of mucus or serum replaces it; sometimes there may be nervous symptoms, especially flushings of the face and body, which occur daily, weekly, or every month or year. Nervous symptoms usual in nulliparae. Hysterical manifestations may occur. Sometimes patients complain that between the menstrual periods they have symptoms of a period, but there is no flow of blood. This, which Fasbender studied, is described by Martin as "mittelschmerz," and means pain between the periods. Often has to do with diseased genitals and the symptoms of the Molimina are sometimes so severe as to require treatment.

HYGIENE OF MENSTRUATION.

A young girl, developing into womanhood, goes through a very important change and is liable to diseases which may influence her whole life. The nervous system, in addition to the genitals, is growing rapidly, and it is essential that she be given proper food, etc., for growth; she is more liable to headache and all sorts of nervous manifestations. Anemia, especially, if the congenital narrowness

of the aorta described by Virchow as a cause of chlorosis exists, is likely to develop now.

Very recently a foreign author has advanced the idea that chlorosis is an infectious disease. Very little proof. She needs all her blood for her animal organism and, therefore, ought not to work hard at anything else, especially *school* study. It is better that the girl go to bed with her first menses.

How often we see the girl shoot up into the woman, but get thin, pale, yellow, subject to headaches, eye strain, indigestion, urticaria, etc. Take them out of school, send to the country, and the change is something wonderful. Mothers should instruct the girl as to what is coming, as she may try to conceal the flow, or may be greatly alarmed by its appearance. There may be some premonitory signs, as a discharge of mucus several months before blood comes. Pain and drawing in the lower abdomen.

During an ordinary menstrual period, women had better lie on sofa, still better in bed. Often, especially in the poorer classes, they do neither, but work around as usual. She should not go to a *ball* or party where she can dance and get cold. No active exercise, e. g., horse-riding, skating, tennis. Should wear warmer *clothing*. Avoid cold bathing, especially sea bathing. Fatal cases after the latter. Girls do these things to conceal their condition, but they are really "unwell." Rest is the best remedy for the condition brought about by the neglect of these rules, as Dysmenorrhea, Amenorrhea, Menorrhagia. Great good accomplished by adherence to above rules. Use medicine very sparingly.

Patient should avoid cohabitation before, during, and for a few days after the period. It may cause a severe hemorrhage, by increasing pelvic congestion, and perhaps regurgitation of the blood along the Fallopian Tube. Further, the menstrual blood may cause a urethritis in the male. In the Mosaic Law cohabitation is forbidden, the woman being unclean.

A few words about *vicarious menstruation*. This is a periodic discharge of blood from some surface other than the uterus, which discharge is to represent the monthly flow, such flow being absent from the uterus.

Three (3) conditions must be fulfilled by the flow:

1. The normal flow must be absent during the period:
2. The organ from which the blood comes must be normal:
3. The periodicity must be absolute.

Hemorrhages have been described as coming from the nose, mouth, lungs, stomach, breasts, piles, or an ulcer. Dr. Jaggard says he has seen no authentic case of vicarious menstruation, and there was always some other cause for the bleeding. The author saw a case of irregular bleeding from an apparently healthy nipple,

menses absent. Playfair says it occurs in young, delicate, mobile, nervous women, and it may be limited to puberty, or perhaps the whole sexual life.

Precocious Menstruation is that which occurs before the usual time of puberty. It is due, according to Raciborski, to a premature development of the "genital sense." And Raciborski says the genital sense is that power which causes the development of the Graafian follicles.

Parvin mentions a case where menses began at 3½ years. Sometimes there is some disease underlying the phenomenon, though often the girls were healthy. Not seldom there is a sort of pseudo-menstruation in girl babies in the first week of life. There is a bloody mucoid discharge from the vagina, which lasts twenty-four to seventy-two hours. The general health of the infant is not disturbed, and the discharge does not recur.

Precocious births have occurred. Instances on record where a girl eight years old had a child.

CONCEPTION

in its obstetric sense, means the union of the male and female elements of procreation: from which union a new being is developed. It is the means for the propagation of the species, and has variously been termed, fecundation, impregnation, fertilization, incarnation. We have considered the formation of the ova in the female; we have seen how they were prepared for the reception of the male element. Now we will consider the formation of the male element and how it reaches the ovum.

The *Testicle* is the main reproductive organ of the male, and all the other organs must be considered accessory to it. It is composed of bunches of convoluted tubules of great length and intricate winding, surrounded by a strong, whitish, silvery membrane, the Tunica Albuginea, which dips down between the tubules as septae, carrying the vessels and nerves. These tubules, which are several feet long, are lined with several layers of epithelial cells, the lowest layer being inactive. The upper layers are active and are called *Spermatoblasts.* They become grouped together, the nucleus goes off to one side, the body of the cell becomes thinned out into a long, cilia-like filament, which projects into the lumen of the tube. Finally the cell becomes detached, having this shape, and is called the Spermatozoid. The head represents the nucleus, the tail the cell protoplasm, so that Spermatozoid is a real cell, and as it is derived from the primordial cells of the testicle, the union with the ovum, is the union of like morphological elements.

The cells in the upper layers of the tubular wall do not undergo these changes, but become free in the lumen, mix with the semen,

part of which they probably form by secretion. A fluid is present in the tubule and is probably from the large lymph spaces in the septae and around the ducts.

The secretion passes along the vas deferens to the vesiculae seminales, where it is mixed with the secretion of those bodies.

During cohabitation and ejaculation, the fluid is discharged from the vesiculæ seminales, being at the same time mixed with the secretion of Cowper's glands, the Prostate and the Urethra. It is deposited in the posterior part of the vagina, and has the following characteristics:

It is a thin, yellowish, white, creamy, fluid, alkaline, muscilaginous, and has an odor peculiar to itself. The odor is due to a mixture of the various glandular secretions present in the sperma or semen, as it is called. Amount discharged varies from one to ten grams, but much larger amounts have been collected. Contains the spermatozoids, the spermatic cells, epithelium, leucocytes, crystals. We are most interested in the spermatozoids.

The number of spermatozoids in a given ejaculation is sometimes enormous. Lode, of Vienna, computed that there were 227,257,900 in one specimen.

These were formerly considered animalculæ up to 1840, when Kollicker and Lallemand proved their origin from epithelial cells, while Landois gives their formation as from cilia, of the epithelial spermatoblasts. A spermatozoid consists of a head, a body, a tail and a terminal filament. The head is oval and on cross-section appears like this ; on flat section . The tail has the power of rapid undulation, very much like the movement of cilia, by means of which the spermatozoid is moved from place to place. Proved by Spallanzini, 1768, that they are the active fertilizing elements of the semen, and it is to them that I have always referred in speaking of the male element, and it is the union of a spermatozoid with the ovum that constitutes conception, fertilization, or fecundation. This will serve as a definition. Fertilization is the union of the active male element of the semen of the male, the spermatozoid, with the product of ovarian activity of the female, the ovum.

Where does this union take place?

Some authors say the pavilion of the Fallopian Tube. Others claim the uterus; others still, the peritoneal cavity.

Owing to the frequent occurrence of pregnancy in the Fallopian Tube and its very rare occurrence in the ovary (only three cases on record), the authors are quite unanimous in placing the site of fecundation in the outer end of the Fallopian tube, called the pavilion.

Spermatozoids, however, have been found all over the ovary, and even on the ovary of the opposite side, and it is probable that the union can take place anywhere from the ovary to the external

os, or wherever a spermatozoid finds an ovum ready to be fertilized. (J. Veit.)

How does the ovum get into the tube?

Several theories:

1. That during copulation the fimbriated end of the Fallopian tube is erected and is applied to the ovary. Said to have been proven by post mortem injections of the blood vessels of the tube, but this has been denied by competent observers.

2. Said that a stream of serum exists, passing from the ovary to the tube, caused by the ciliated epithelium of the fimbriated extremity.

Since the fimbriae of the tube are such delicate things, it is almost impossible to imagine how they could raise the heavy intestines above them and get on the ovary. Probably they have the power of directing the current of serum set up by their ciliated cells.

How do the spermatozoids reach the ovum lying in the pavilion of the tube?

Again several theories which are more or less accepted.

1. The semen is ejaculated directly into the uterus. Disproven by the anatomy of the parts.

2. That the penis acts as a piston, forcing the semen into the uterus. Not plausible.

3. That the uterus, in a state of erection, after coitus, relaxes and aspirates up the semen, which makes a pool in the back of the vagina into which the cervix dips. Some color to this view, but if so, the uterus ought to suck up the various germs, etc., existing in the vagina, which is contradicted by the fact that the uterine cavity is aseptic.

4. That during copulation a piece of cervical mucus hangs from the cervix, and on relaxation this goes back into the uterus, carrying the semen with it. (Kristeller.) Same objection as to No. 3.

5. Capillarity of the cervix.

6. The spermatozoids get into the uterus by their own natural movements. This is the most generally accepted theory, and is the most natural. The other factors may help, but that the wriggling motion is sufficient to bring a spermatozoid to the tube is shown by the numerous cases of fertilization where the semen has been deposited on the external genitals.

   a. Case of attempted rape, if the woman is strong enough, there is no immissio penis, and the semen may be discharged on the vulva.

   b. Cases of pin-hole hymen, where the same condition occurs; pregnancy repeatedly takes place, semen being deposited on the vulva.

The cilia of the uterine epithelium move toward the os internum, not, as heretofore believed, to the opening of the tube. The spermatozoids have to overcome this movement, which they do. It is said that they go at the rate of 3 m.m. a minute, but various observers give different opinions; one says an inch in seven and a half minutes. In a few hours the spermatozoids are found all over the tubes and ovaries. They find in the infundibulum of the tube, plenty of nooks wherein to wait for an ovum to come along. The spermatozoids find the conditions favorable to life and they live, certainly a week, possibly longer, in the genitalia of the woman. Thus if the spermatozoids find no ovum when they come, they can wait till one is ripened and extruded.

What happens when the ovum and the spermatozoids meet?

Millions of spermatozoids die on the way to the tube and only one spermatozoid is needed or used in fertilizing an ovum.

The spermatozoid reaches the ovum and penetrates the zona pellucida. This, according to Fol, of Geneva, is a soft substance and easily penetrable by the spermatozoid. It loses its tail, becomes round, is surrounded by a halo of radiating lines and progresses toward the female pronucleus. Fusion takes place and then the egg is fertile. The rest of the spermatozoids die and disappear. The ovum now proceeds to the uterus. The ciliated epithelia provide the mechanism, also the peristalsis of the tube. The uterine mucosa has already been prepared for its reception; the ovum becomes attached to this, the cell divides by segmentation (Karyokinesis), and the fetus develops as you learned in your Embryology. Sometimes these changes do not occur as regularly as here laid down, e. g., the external and internal wandering of the ovum or of the spermatozoids.

The Corpus Luteum.

After the escape of the ovum with the Discus Proligerus and a little liquor folliculi out of the Graafian Follicle, the follicle collapses. A small hemorrhage may occur in it, though not always. Owing to the increased vascularity of the parts because of the growing impregnated ovum in the uterus, the follicle takes on an increased growth. The cells of the membrana granulosa increase in size and number, and a yellow refracting body is developed in them, called lutein. Blood vessels develop in the mass from the membrana granulosa which is thrown into folds, and numerous white cells are found around them.

The growth increases till the beginning of the fourth month, when the process begins to go backward. The collapsed Graafian follicle may have the size of a hazel-nut, is light yellow in color, has a zigzag outline, and is called a Corpus Luteum (yellow body).

Toward the end of pregnancy the Corpus Luteum gets smaller,

the contents being absorbed and the formed elements being changed into connective tissue, and several months after labor traces of it can still be made out, *i. e.*, it leaves a small, retracted scar.

If the ovum which came from the Graafian follicle does not become fertilized, the pelvic congestion incident to pregnancy does not occur, and the changes are very much less marked, and regression occurs quickly—say, *at the thirtieth day, the scar left is small and sunken.*

The large Corpus Luteum of pregnancy is sometimes called a *True Corpus Luteum.* The small Corpus Luteum of menstruation is sometimes called a *False Corpus Luteum.* It is usually possible to distinguish one from the other, but as Hirst has shown, the ovaries of two virgins, in which the Corpus Luteum of menstruation was almost exactly like a Corpus Luteum of pregnancy, one cannot always be certain.

The anatomical evidence of menstruation is the Corpus Luteum. It is these scars that distort the ovaries of every menstruating woman, and it was the scars of eight Corpora Lutea that Hyrtl found in the ovaries of the girl who had died after eight menstruations.

Function of Corpus Luteum.

Born and Fraenkel say it is glandular, possessing an internal secretion which regulates the function of menstruation and pregnancy. His and Clark say it develops the peripheral ovarian circulation, and prevents scar formation, which otherwise would, in time, destroy the functions of the ovary.

We have described the normal migrations of the spermatozoids and the normal migration of the ovum, both fertilized and unfertilized. But these are not always so typical. Observers were struck by the occurrence of abnormal migrations.

Case I. Rokitansky. Case of animals with two-horned uteri, less number Corpora Lutea on one side than of fetuses on that side.

Women with atresia of the left tube in pregnancy—ovum in the uterus, but Corpus Luteum in the left ovary. Called external *wandering* of the *ovum.*

Case II, of Luschka. Small horn of uterus. Corpus Luteum in other ovary.

External Wandering of Ovum.

Case III. Right tube obliterated. Pregnancy in the uterus and in the tube, which later ruptured. N. Y. Medical Gazette, 1870. Both Corpora Lutea in right ovary.

It may happen by chronic pelvic peritonitis, the two tubes and ovaries are bound down near to each other behind the uterus, and thus the ovum easily passes to the wrong side.

Case IV, from Weber Von Ebenhoff: Right tube obliterated. Corpus Luteum in left ovary. Pregnancy in right tube's end.

Internal Wandering.

It has long been believed that an ovum could wander down the tube of one side, through the uterus into the tube of the other side

But the case in the human which would support this theory has been questioned. In the Medical News, June 2, 1900, Morfit reports case of a woman whose right tube and ovary had been removed several years ago. She became pregnant in the stump of the right tube, which ruptured, hemorrhage, laparotomy. Recovery. Nothing said about pathological findings in the end of right tube. In animals, if the ovary and the part of the tube of one side are extirpated, ova are found in both horns of the uterus.

This is simply the passage of the ovum from one horn to the other, and it is not to be transferred to man. Thus far no positive case on record in the human.

Case V. Double-horned uterus, one horn closed. Corpus Luteum on the side of closed horn; pregnancy in closed horn. External wandering of the spermatozoid.

How long does it take for the ovum to travel from the fimbriated extremity to the uterus? Not definitely known, but from analogy with mammals, placed at about *eight days.* Reichert has found the ovum in the uterus covered with the decidua reflexa fourteen days after the menstruation.

The Determination of Sex.

It is believed that there must be some law governing the production of male and females, because the proportion in nearly all countries is 106 *males* to 100 *females,* and as the males have a higher mortality rate, this over-production serves to keep up the proper relation. What the law is, no one knows. The differentiation of sex occurs about the *tenth week,* that is, of the external organs, but the internal organs show this a few weeks earlier.

Sex may be determined:

I. In the ovum itself.
II. At the time of fertilization, by some action of the spermatozoid.
III. Sex undetermined at first, but is influenced by external conditions in the first few months.

The oldest theory was that of Hippocrates and Galen, who believed the right ovary was for boys, the left for girls. Henke, in 1786, believed that women could produce boys or girls at will, depending on which side they were lying at the coition. Cases where women with extirpated right ovaries having boys, and with only a right ovary having girls are common enough to refute this. Again, often at a post mortem, when the patient had a boy, we find the corpus luteum on the left side. That one ovary produces one sex, no one now believes, but the belief that the *sex resides in the ovum and that there are male and female ova is widely spread,* the similarity of the sex of uni-oval twins tending to show this.

Another theory is that of the age of the parents. Hofacker and Sadler. If the father is older, more boys; if the father is younger, more girls. This does not hold good, and Ahlfeld has shown that old primipara have a plurality of boys.

Janke's theory that the party weaker in the sexual act produces his opposite. That if a male child is wanted, husband should live on vegetables and the wife be nourished on the best of food.

Thury's theory that ova of the beginning of *heat,* if fertilized, produce cows, later bulls. This is, to a degree, true of animals, but cannot be carried over to the human.

The idea of Dusing, that natural selection plays a part. That nature produces more of that sex which is necessary for the propagation of the species. This changes the wording of the proposition only.

The theory of *Ploss and Waldeyer.* That the ovum is indifferent, but that *environment* alters it in the first weeks. Supported by the fact that in the lower forms of life, as melons and cucumbers, warmth, light and darkness produce males; the opposite conditions produce females. According to these authors, even among animals, including the human, good surroundings produce females. But several observers, Raffaeus and Breslau, with 58¼ million cases used for statistics, have disproved this. But the occurrence of hermaphrodites and the fact that until the sixth week organs exist which are neuter, speak for the theory, that sex is influenced by something later than conception.

The theory of sex determination recently advanced by *Dr. Schenk,* of Vienna, is in line with that of Pryor, that the nutrition of the mother has a marked influence on the sex of the child. If the mother's health be raised, if her metabolism is so affected by conditions during pregnancy that sugar appears in the urine, the product of conception will be female; if the patient is kept on a diet that will prevent sugar, or reduce the carbohydrates in the urine, the child will be a boy. According to Schenk, the state of maternal nutrition is evidenced by the amount of sugar or its equivalent in excreted carbohydrates in the urine.

It would be well to wait for further experimentation and clinical reports before forming an opinion, though the evidence adduced by Schenk is little convincing.

We must admit that we know next to nothing positive on the subject.

Time of Conception.

Highly important to know at just what time the conception takes place, to be able to determine the date of confinement, and also to know how long an ovum must remain in the uterus for full development; but our positive knowledge on this point is very limited. There are several factors involved:

1. We must know the date of the coitus which fertilizes the ovum.
2. We must know when the ovum left the ovary.
3. We must know how long it takes the ovum to reach the tube, and the spermatozoids to reach the tube. The latter two points not known at all, while the date of coitus is uncertain—we must take the woman's word.

I. *Old Theory.* Formerly, when it was believed that every four weeks an ovum was ripened and that this was simultaneous with the menstruation, it was believed that the ovum of the last menstruation was the one fertilized, and as far back as medicine extends, the woman reckoned from the first day to the last menstruation.

II. *New Theory.* Recently Loewenhardt and Reichert said that it was the ovum of the *first* period *missed* that is fertilized. That the ovum being fertilized, is developed on the Decidua Menstrualis and that the menstrual flow is, therefore, absent. Power says, a woman menstruates because she does not conceive; when she does not conceive she menstruates.

III. *Thirdly*, an ovum from between two periods may be fertilized, then the next period is missed and the conception dates from the middle of two periods. The spermatozoids can live several weeks in the passages of the female; but an ovum has a much shorter life, possibly a week; so that it makes little difference when an ovum is extruded, it may be fertilized at any time by a spermatozoid lying in wait.

I. Those authors who believe it was the ovum of the last menstruation present which is fertilized, argued thus:

At menstrution an ovum is extruded; after menstruation copulation and fertilization take place, the next period is, therefore, missing,—the woman is pregnant. If this theory is true it is very surprising that no one has had an abortion dating from the period of

the last menstruation and the first one missed. Every gynecologist will pass a sound on a woman who has just had a period. If she has missed a period he will not do it.

Further, the examination of young embryos almost always shows that they date from the first period missed.

II. The New Theory that the ovum of the first menstruation missed is fertilized has many points in its favor. (Two just mentioned.) Conceptions are believed to occur most often in the seven days after menstruation. The women know this, and often will not allow coitus till after the week or ten days, if they wish to avoid having children. Jewish law required this abstinence, saying that the woman was unclean till then and they take a purifying bath on the seventh day. See Leviticus, Chap. XV, verse 19, and following. The women date their pregnancy from the first night when they are "clean" and can leave their bed of isolation for that of the husband. The Jewish women are very prolific, so this might prove something for the new theory, as it is not believed an ovum can live more than eight days after extrusion from the Graafian Follicle.

It is the universal custom, however, to reckon nine months from the first day of the last menstruation. Clinical investigation of the subject is needed.

While admitting that fertilization may occur at any time of a woman's active sexual life, the most conceptions occur after the last menstruation and before the first one missed. Thus we may have the time of pregnancy lasting 40 weeks,—10 lunar months, or 43 or 44 weeks—11 lunar months. Pregnancy lasts, on an average, 280 days, so the 10 month type is the more common. The season of the year has something to do with conceptions. The majority occur in Spring, May and June.

In country districts during the harvest time, fewer conceptions—hard work. In countries where conscriptions for soldiers take place, there are many conceptions just before the conscriptions. Illegitimate conceptions occur most often in the summer months. Climate exerts some influence, the further north, in the cold regions, the less the frequency.

THE PHYSIOLOGY OF PREGNANCY.

We have followed the ovum up to Fecundation and we have seen it form an attachment to the uterine wall. *The woman is now pregnant.* The period from now until she expels the product of conception, in labor, is called *pregnancy.*

During pregnancy changes occur which affect every organ in the woman's body. It is an important epoch of her life. Defects which were latent may become apparent now; her general resistance to outward influence is less; she is more liable to cold, to infection, to nervous manifestations, neuralgia and many disturbances which we will consider later.

The changes are:

I. Local:—confined to the genitalia;
II. General:—of other organs in the body and the general metabolism.

Local Changes.

The most marked change is in the uterus, which will be apparent when one considers that the virgin uterus is 2½ inches long and weighs a few ounces, whereas the uterus at the end of gestation is the size of a watermelon and weighs about two pounds (when empty). The ovum adheres to the decidua menstrualis, and by its irritation, it causes a renewed growth of the mucous membrane. This changes it into the decidua graviditatis. This growth of the mucous membrane is so active that it very soon grows over the tiny ovum.

The ovum when it enters the uterine cavity is about 1 mm. in diameter. On the way to the uterus the ectoderm has developed small projections on the surface (the primitive villi). These villi become attached to the surface of the mucous membrane of the uterus, dipping into it a little. The ovum may be caught in a fold of the endometrium. The villi, growing into the mucous membrane, carry the epithelium with them (syncytium). This is one theory. Most later workers believe the syncytium is ovular in origin. This layer breaks, and the villi grow directly into the connective tissue of the endometrium, *i. e.*, into the mass of decidual cells, so that the epithelium of the ovum, the ectoderm, comes to lie against the connective tissue of the uterus. The ovum is then completely sur-

rounded by mucous membrane, but the different parts of the membrane are differently named.

The part on which the ovum rests is called the decidua serotina.

The part which has grown over the ovum, the decidua reflexa.

The part which lines the rest of the uterus, the decidua vera.

The manner in which the ovum is embedded in the decidua is still subject to discussion. The recent publication of Peter's study of a very young ovum has not fully settled it, though this work is of great importance.

Peters describes an ovum found in the uterus of a woman who committed suicide within a week of the cessation of the menses. It was the size of a hempseed. The ovum had burrowed into the mucosa, the point of entrance being marked by a tiny blood clot. The epiblast, or trophoblast, had worked into the decidua to the capillaries and its cells were in communication with them. Inside the trophoblast, the mesoblast, a thin layer, was already showing by its growth, the formation of primitive villi. The outer layers of the trophoblast also showed, by absence of cell wall and presence of many grouped nuclei, the formation of syncytium.

The decidua are now developed in accordance with the growth of the contained egg. This latter rapidly increases in size. The little villi of the primitive chorion form attachments to the decidua. The decidua reflexa is stretched by the growing ovum and is thinned very much. It is smooth on the outside, has no epithelial covering and is made up of round and spindle shaped, so-called decidua cells; it contains no blood vessels and soon begins to undergo a fatty degeneration which is complete at the end of pregnancy.

At the fourth month the decidua reflexa meets the decidua vera and they fuse together, forming a membrane as thin as a blotter, not separable, or only in part. The decidua is stimulated to grow even if the pregnancy occurs outside of uterus, e. g., in tubal pregnancy. At the beginning of pregnancy it is about 7 mm. thick; it increases to 1 cm. thick, perhaps thicker than the uterine wall, covering the ostia of the tube and sometimes the internal os, and from the third month on gets thinner as the growing ovum expands it. Toward the end of pregnancy they, *i. e.*, the decidua vera and reflexa, are quite thin and microscopically are as follows: Next to the muscle is a layer of decidual cells, pierced by the glands, called the basal layer. On this is a layer loosely made up, a sort of flattened network of glands, called the glandular or ampullary layer. On top of this, the decidua thickens and the cells lie together in a compact layer called the cellular layer. The glands are spare here. The blood vessels come up to the surface around the glands in a cork-screw fashion, quite vertically. The decidual cells are developed from the connective tissue of the mucosa, and are large, irreg-

ularly round, usually with one nucleus, but sometimes with many nuclei. The cells may sometimes be spindle-shaped and are characterized by their large amount of protoplasm. They have a peculiar habit of wandering about the pregnant woman and have been found in the brain, kidneys, lungs and liver. Perhaps they form emboli. Have been by some regarded as pathological, especially in Eclampsia. They have been found from the sixth month of pregnancy on. The serotine decidua is quite thin and the distinction of an ampullary and cellular layer is not so marked—further the blood vessels are more developed and in piercing the decidua they lose all of their coats save the intima, spreading out in the form of sinuses.

This separation of the fetus and its membranes from the mother takes place in the ampullary layer, *i. e.*, at the expense of the mother; sometimes the separation takes place in the cellular layer.

When the ovum enters the uterus, owing to the shape of the uterine cavity, which on cross section is like this, it finds more opportunity to attach itself to the anterior or posterior wall than at the sides; it finds very little chance on the fundus and this in accordance with clinical experience. At the sides of the uterus the decidua is thinner, and sometimes when the ovum is extruded in an early abortion, say the second month, the decidua may present a sieve-like appearance in that portion from the corner of the uterus. We shall have occasion to refer to this point again when we come to describe the *placenta*.

The old theory regarding the formation of the decidua was entirely different from the one just given. It was supposed that at the beginning of pregnancy the uterus was lined with a thick fibrinous exudate. As this exudate was cast off at the end of pregnancy (and also during menstruation) it was called a decidua. The fertilized ovum coming down the tube pushed the exudate ahead of it, therefore this part was called the decidua reflexa. Now a new exudate formed under the ovum binding it to the uterine mucosa, therefore called the decidua serotina (or late decidua), while the rest of the decidua was called vera. This is Wm. Hunter's theory and it is thus that the various parts of the decidua got their names, which are retained for convenience, although according to our present theory they are not good terms. The part the mucous membrane of the cervix takes, is not settled. It is not quite certain that it forms no decidua, for recently a few cases have been published that show the placenta may become attached to the cervical

mucosa, and we must conclude it becomes altered in a manner similar to that of the body of the uterus, in certain pathological conditions. Probably there are no specific changes in its mucous membrane, in the great majority of cases.

Changes of the Muscle During Pregnancy.

The normal uterus of a nulligravida is a pear-shaped organ, 6½ cm. long, 2½ cm. thick and 4 wide, weighs 42 grams in nulliparae, in multiparae 55 grams. It is made up of hard unstriped muscle, covered in part by the peritoneum, moored to the pelvis by eight so-called ligaments and attached to the pelvic floor by means of the vagina.

During the first half of pregnancy the uterus enlarges as the result of a hyperplasia of its muscular substance. This is true excentric growth is much more rapid than is sufficient to accommodate the growing ovum and is not due to expansion by the growing ovum, as the same changes occur in the uterus even when the ovum develops outside of it. It is a hypertrophy and also hyperplasia of the cells. The wall of the uterus, which was eight millimeters before pregnancy, grows to be 25 mm. thick by the fourth month. This is the thickest it is during pregnancy, since from now on the egg, growing, expands the uterus, the decidua reflexa coming to lie on the decidua vera. At the end of pregnancy the uterine wall may be four to six mm. thick. The cells increase in number and size. A muscle fibre of the normal uterus is like this: A muscle fibre of the uterus at term is like this: Cells are said to be somewhat fibrillated.

There are several layers of muscle in the uterine wall. These are arranged in a very complicated manner, crossing and recrossing each other, but in certain directions. There develops on the inner surface under the mucous membrane a special contractile layer, possibly from embryonal elements hitherto undeveloped.

The bundles of muscular fibres run from the peritoneal surface obliquely toward the mucous membrane and are laid one on the other like shingles on a roof.

In general there are *three layers of muscle*, of which the external run more or less longitudinally; the internal, more or less circularly, while the middle layer, which is more vascular, has lamellae which

run in all directions. The fibres can be made out to pursue a course of circular rings around the tubes and internal os, and the longitudinal fibres of the tubes are continued fan-shaped on to the uterus. After labor the uterus contracts down into a hard ball about the size of a fetal head, is anteverted and has *walls, 2 to 2½ cm. thick.* The fibres are shortened and the various lamellæ of muscle are slid one on the other.

The *blood vessels undergo a hypertrophy* and *hyperplasia.* The arterial supply of the uterus is derived from the *uterine artery,* which is a branch of the *internal iliac,* the *ovarian,* which is a branch of the aorta, and the *funicular,* a branch of the vesical which passes up the round ligament and goes to join the ovarian at the fundus uteri.

The anastomoses are free and have a long spiral form, "corkscrews." The uterine artery gives off a branch just after it reaches the uterus about the level of the internal os. This branch encircles the uterus and anastomoses with its companion, forming the *circular artery.* Important to consider in certain operations on the cervix.

The uterine artery then ascends along the side of the uterus to join the ovarian. This long corkscrew artery, from which many branches are given off, is sometimes called the Puerperal artery.

The arteries in the uterus are surroundd by connective tissue, but lie between the muscular lamellae and may be compressed by the contracting muscular fibres or by superimposition of the layers of muscle.

The *veins* are large spaces between the muscular bundles, lined by a single layer of endothelium; these are called *"sinuses"* and are large, especially at the placental site, so that you can somtimes put your finger in them. They lead outward through the muscle of the uterus in to a plexus at the side of the uterus, the *uterine plexus.* This is a large mesh of veins which lies at the side of the uterus and leads into the *hypogastric vein,* which empties into the *internal iliac* vein. The veins from the upper part of the uterus and Fallopian tube lead into the *Pampiniform plexus.* This terminates on the right side in the *inferior vena cava,* on the left side in the *renal vein.* These plexuses are of large size and important in the consideration of puerperal fever.

The *Lymphatics* of the uterus begin as large spaces beneath the endometrium and in large numbers traverse the broad ligaments communicating with stomatae in the peritoneum. The lymphatics of the *corpus uteri empty into the lumbar glands,* those of the *cervix,* into the *pelvic glands,* those which accompany the round ligament empty into the upper set of *deep inguinal glands,* those of the lower vagina and vulva go to the *superficial* and *deep inguinal* glands and through these, with the glands around the *external iliac arteries.*

The large size and great number of the lymphatics in and around

the uterus must be noted and the distribution of the various streams of lymph is important in the consideration of puerperal fever.

Change in the Shape of the Uterus.

First in the anterior-posterior diameter of the corpus. Often it seems that a certain part of the uterus is enlarged. The ovum situated in one part of the uterus softens and distends that part. This sign is of value in the early diagnosis of pregnancy. Thus the left side may be found large, thick and soft, and the right small, thin and hard, with a distinct groove between. The junction of the cervix with the corpus is softer than the rest. This allows the hands to compress the part below the body between them, sometimes almost together, thus: This is called Hegar's sign of pregnancy.

After the second month it begins to enlarge laterally and the corpus begins to assume a round form. There is a real eccentric hypertrophy of the uterus till the fourth month. The cervix grows slowly up to the fourth month, after which little change in it except an increase in its succulence. The change is due to increase in the size of the elements with exudation. As the uterus enlarges it becomes more anteverted and lies on the bladder. The fundus lies on the bladder, the cervix is directed backward; the uterus lies heavily on the bladder, especially when the intra abdominal tension is increased.

For the first three months, the uterus is entirely a pelvic organ, but now it rises above the brim and soon the abdomen begins to enlarge. Pinard says earlier. In primiparae the uterus is flattened out more antero-posteriorly, is ovoidal. Its consistency is *elastic, spongy, soft.* In multiparae the uterine body is more spherical.

The uterus in the second three months (or trimester) is not so strongly anteflexed, rests against the abdominal wall, and bladder symptoms usually disappear if present. The body of the uterus is round, the cervix seeming like a little tumor adherent to the body. The increase in size begins now to be at the expense of the fundus, for the uterus begins to grow here. This is shown by the insertion of the tubes and round ligaments.

At the end of the sixth month the uterus is at the navel. At the end of the 39th week it has reached the ensiform cartilage. Then the heads sinks into the pelvis (in primiparae) and the fundus of the uterus falls forward, sinking at the same time. It comes to occupy the level it had at the eighth month, but projects more in front. This process is called "lightening." In multiparae these changes are not so constant, as the abdominal walls are relaxed. The posterior surface of the uterus is flattened while the anterior surface is convex—due to the fact that the posterior surface lies on the spinal column while the anterior wall is supported by the distended abdominal wall.

The uterus at term is deviated to the right, in a large proportion of cases, at the same time it is twisted on itself—dextroversion and position.

This condition is due to several causes:
(1) General habit of sleeping on the right side.
(2) Feces and gas in the sigmoid flexure.
(3) Congenital twisting in growth.
(4) Round ligament is shorter on right side.

Thus in listening to uterine sounds, those from the left side are plainer, and this is why during certain operations, as Caesarean Section, the uterus must first be brought to the median line. The position varies with that of the woman.

If she is standing, uterus falls forward and rests on anterior abdominal wall.

If she is lying, falls back and to either side of the spinal column, but usually right.

If she is lying on her side, falls to that side like a flaccid sac.

The uterus pushes everything away from it. No intestines are between it and the abdominal wall. The intestines are forced up and to the left side almost always. The colon retains its usual position. The uterus exerts no direct pressure on the kidneys, liver, or the stomach, and thus is not answerable for certain troubles of these organs ascribed to it, e. g., nephritis, jaundice, intercostal neuralgia, etc. It lies posteriorly on the promontory of the sacrum and lower lumbar vertebrae, the aorta and the ascending cava.

The uterus in the last three months lies upon the ureters as they cross the pelvic brim; during this time, also, there is usually traction on the bladder, which accounts for the bladder symptoms. These symptoms increase when the head has sunk into the pelvis, which occurs in primiparae in the last two weeks. This is called "lightening" before labor.

During pregnancy the bladder is a pelvic organ. During labor and the unfolding of the lower uterine segment the bladder is drawn up into the abdomen and becomes an abdominal organ; the urethra is often stretched and becomes long, so you need a long catheter for labor cases

The capacity of the virgin uterus is 2 c. c., that of the uterus at term four or five thousand c. c.

The Cervix and Lower Uterine Segment.

The unimpregnated uterus is divided anatomically into two divisions—the body and the cervix. The cervix is about as long as the body and it is divided into three divisions, by the insertion of the

vagina. The anterior wall of the vagina is inserted about 1½ cm. from the external os. The posterior wall of the vagina is inserted about 3 cm. from the external os.

The cervix extends above the vaginal insertion about 1 cm.

That portion of the cervix that is completely in the vagina is called the "portio vaginalis" (c); that which lies behind in the vagina and in front against the bladder, the "median portion" (b); and that above the vaginal insertion behind, the "supra-vaginal portion" (a).

The cervix during pregnancy becomes softened, by imbibition, and a moderate hypertrophy of its elements occurs. Softening goes from below upward; the mucous glands secrete freely. There is, however, no distinctive line between the muscle of the cervix and that of the corpus uteri. The question as to whether the cervix does or does not take part in forming the cavity of the uterus for the growing ovum has been argued for years.

There are two theories,—really two schools,—and the polemic was formerly very sharp, but now a middle position is being taken, a tendency to which is evinced in many other places in Obstetrics.

Old Theory. The Vienna theory, or that of *Bandl.*

That from the fifth month on, the upper part of the cervix was dilated and drawn up to assist in forming the cavity of the uterus. That this process continued and that at the end of pregnancy the vaginal portion only remained unused and needed to be dilated by the contractions of the uterus. According to this theory a uterus at term would be like this:

II. *Schroeder's Theory.* The New Theory, or that of the Berlin School.

That the cervix was not used for the cavity of the uterus; that the os internum remained closed till very near the advent of labor;

that the lower uterine segment was formed entirely from the lower part of the ulterus. Stoltz, as early as 1826, taught this theory.

The anatomy is the same in all cases, the opinions differ as to where the Lower Uterine Segment comes from. Above the contraction ring the muscle bundles are thickly placed together and the connective tissue is not so thick. Below it, that portion which is dilated to form the lower uterine segment, the wall is thin, relaxed, the muscular bundles are separated from each other and are few, and there is a larger amount of connective tissue. The peritoneum is loosely attached here. The bearing this has on the pathology of labor will be considered next year.

We believe that the lower uterine segment is mostly derived from the corpus, but that when the dilation begins in pregnancy, as it generally does in primigravidae, the upper part of the cervix takes a certain part.

In multiparae, however, the lower uterine segment is not formed till near labor and the os internum remains, therefore, closed till the onset of regular uterine contractions.

There are several arguments which support the old theory:

1. Preparations sometimes show relics of the arbor vitae of the cervix spread out over the lower uterine segment.

2. The membranes are adherent to the uterine wall only to a point near the internal os. It is held that the cervical mucous membrane cannot produce decidua. Recently cases reported, however, where the placenta was attached to the cervix.

3. On examination of the uterus per vaginam, just before labor it is possible to feel an external os, internal os, and above this a third ring, which seems to come from an unfolding of the upper portion of the cervix.

Most preparations of uteri during pregnancy show the cervix closed throughout its length. Practically it makes little difference which theory one accepts. Suffice to know the anatomical and clin-

ical differences between the lower uterine segment and the fundus of the uterus.

The *peritoneum of the uterus* grows with it, as only in pathological cases do we find scars, and later in labor it is thrown into minute folds which run in certain directions, e. g., transversely, obliquely and longitudinally, corresponding to the underlying muscle bundles. The surface of the uterus at term is twenty times that of the unimpregnated state.

To a certain extent the peritoneal covering of the uterus at term is derived from the broad ligaments unfolding and the uterus developing btween the two plates of the ligament.

According to Schmorl there are decidual growths on the peritoneal surface of the uterus and on the ovaries. These may be 2 or 3 mm. thick. Sometimes they are found on the omentum. Resemble, in appearance, military tubercles. They are just under the endothelium, raising it up. Are found from the third month to the tenth, mostly later.

The Round Ligaments.

These enlarge, the muscular elements hypertrophy and increase in number, the ligaments may be as thick as the little finger, are inserted more anteriorly on the face of the uterus, and owing to the higher position of the uterus in the abdomen, the Round Ligaments run more vertically.

Their function is to moor the uterus anteriorly to the pelvis. They can generally be felt; almost always the left one can, owing to the deviation of the uterus to the right side, and they are used to determine the site of the placenta. As they are moored to the fundus of the uterus, the retraction of the fundus away from the pelvis puts them on the stretch and this is an important sign in threatened ruptura uteri. When the placenta is situated on the anterior wall the round ligaments run at the side of the uterus. When the placenta is on the posterior wall they run in front.

The Utero Sacral Ligaments develop, the unstriped muscle fibre in them increases in size and amount, they pull the cervix backward and with the round ligaments serve to keep the axis of the uterus perpendicular to the inlet of the pelvis.

The Fallopian Tubes become thickened, soft, more vertical; the uterine ends are closed, as a rule, but not always; the fimbriated end is open.

The Ovaries are somewhat enlarged, especially the one containing the Corpus Luteum. The ovary may be palpable on the left side (Budin). The other ovary is behind. They are often painful and tender.

The Pelvic Connective Tissue loses its fat to make room for the passage of the child. The unstriped muscle fibres become developed

in it, the lymph spaces are larger, the whole pelvis is in a state of congestion and is more succulent.

The Vagina increases in length and capacity by a real eccentric hypertrophy. It becomes very distensible, the veins increase in size and number, the mucosa is infiltrated, undergoes hypertrophy which deepens the folds it normally has; the papillae swell up so that sometimes they are palpable, as small granules. If the case is gonorrhea they become as large as a pea. Still they may be quite large and yet normal. It takes on a deep blue color (referred to later) and is soft. This begins in the first week of pregnancy and is a useful sign diagnostic of pregnancy.

The secretion is increased very early in pregnancy, and the patient may come to you for the leucorrhea.

When the uterus ascends, it draws the vagina upward. When the head is in the pelvis, it is sometimes thrown into circular folds which may simulate the partly dilated cervix. There may be a prolapse of the anterior vaginal wall.

The Vulva undergoes the same changes—softening, dark coloration, thickening, enlargement, so that the vulva may be patent. It becomes somewhat pigmented, more distensible.

The Perineum has the same changes and these are calculated to allow the great distention necessary for the passage of the child.

Changes in the Pelvic Floor. The pelvic floor may be considered a mass of muscular, connective and fatty tissue filling up the outlet of the true pelvis, covered below by the skin, and lined above by peritoneum. The bladder and uterus lie on it, it is pierced by the urethra, the vagina and rectum. The main muscle in it is the levator ani-coccygeus. The function of this part of the pelvic floor will be described more fully later.

There are two systems of structures in the whole pelvic floor, which are called segments, a pubic and a sacral segment. The pubic segment is made up of the bladder, urethra, anterior vaginal wall, and the fat and blood vessels behind the pelvis. It is loosely attached in front to the pelvis, and at the sides blends with the sacral segment.

The sacral segment is firmly attached to the sacrum and coccyx; it has the strong levator ani-coccygeus, the fascia above and below it, the posterior wall of the vagina, the perineum below. These segments then overlap, thus:

During labor the pubic segment is pulled up and the sacral segment is forced down. The action has been likened to one passing through folding doors, pulling one toward himself and pushing the other away. As a result of this the bladder and urethra and anterior wall of the vagina are drawn up into the peritoneal cavity, the sacral segment is pushed down and backward.

The *pelvic floor projection* is the projection of the perineum

below a line drawn from the sub-pubic ligament to the tip of the sacrum. It is increased during pregnancy, by the growth and sagging of the pelvic floor: increased in retroversion of the gravid uterus, and anything that increases intra pelvic tension.

The Pelvic Joints undergo the same general imbibition; the capsule gets thicker; the synovial fluid increases; the joint becomes more movable. The coccyx and the symphysis pubis mostly affected. The movability of the joints in the olden times was considered absolutely necessary for delivery, but now this is not so considered. Still the softening certainly does do good in special cases and we make use of it in labor sometimes. The movability may develop so markedly that the patient has a wobbling gait in the last months of pregnancy, or may not be able to walk at all. Certainly a good many of the pains during walking of which pregnant women complain are due to relaxation of the pelvic joints.

The Bladder early in pregnancy can rise up into the abdomen when it fills. The uterus lying on it does not produce the frequent urination and the bladder symptoms complained of by gravidae. These symptoms are due to the stretching of the base of the bladder caused by the anteverted uterus and to changes in the pelvic circulation due to pregnancy. Late in pregnancy, the bladder, when filling, has to occupy a place between the uterus and abdominal wall and is therefore flattened and its capacity diminished. Thus is explained the frequent urination at this period. That the bladder suffers direct pressure is only possible very near term and in pathological conditions. Varicose veins in the pelvis may also explain bladder symptoms. The ureters are displaced to the side and upward. They rarely suffer compression. Obstruction is more likely to be due to distortion; both are rare. They may be felt through the bladder vaginally and are said to be enlarged during pregnancy.

CHANGE IN THE PHYSIOLOGY OF THE UTERUS.

It acquires no new functions; those it has, however, are very much increased.

1. Sensibility—not much, but sometimes may be painful to touch and to fetal movements. Varies much in different women.

2. Irritability is that property which makes the uterus respond by contraction, to external stimuli. This increases much in pregnancy, but often this varies with the patient, some patients, the least abdominal manipulation cause contraction of the uterus.

3. Dilatability is increased very much.

4. Contractibility, that power which the uterus possesses of contracting and therefore diminishing its cavity. In the unimpregnated uterus this is shown by the expulsion of clots, tumors, membranes, etc. During pregnancy there are regular painless contractions of the

uterus (B. Hicks, 1871). These last 20 to 30 seconds, are quite painless and are quite irregular as to time.

During labor *this power* (4) becomes *much increased,* but with the exception of pain, the contractions are the same as those during pregnancy. The nature of the uterine contractions:—

(a) They are *involuntary;*
(b) They are slow, they go to acme and decrease;
(c) They are intermittent, but at irregular intervals during pregnancy. During labor they are quite regular.

5. Retractibility, or Tonicity, is that property of the muscle which causes the uterus to exhibit a tendency to revert to its virgin form. Exists alongside of contractibility.

Changes in the Abdominal Wall.

As a result of the growth of the ovum, the abdomen becomes distended and the wall gets thinner. In primiparae with tenser muscles this is less marked. Sometimes the recti muscles are separated and the pregnant uterus may fall forward between them. "Ventre en besace."

The Physics of the Abdomen.

During life the pressure in the abdomen is slightly less than that outside. This is shown by the inrush of air during laparotomy. Inspiration increases the pressure, expiration decreases it. The changes in the pressure brought about by respiration are transmitted throughout the abdomen, are evident on the perineum and organs resting on the pelvic floor, uterus, bladder. The organs of the abdomen are under constant pressure, from the muscles of the abdominal walls and the atmospheric pressure. This contributes greatly to their support. The liver is too heavy to be supported only by the ligamentum suspensorium.

M. Duncan says that the "retentive power" of the abdomen holds the organs in place. What this is, is indefinite. During pregnancy the growing uterus fills out the abdomen and increases the intra-abdominal pressure. This gives rise to many symptoms and conditions to which we will refer often.

In addition, the vertical pressure in the abdomen increases from above downward just as in a column of fluid, when the individual is erect.

The skin shows in 90% of the cases (Credé) purplish, smooth, broad lines called linea gravidarum, or striae gravidarum. They occur most often on the breasts, nates, and thighs, sometimes as far down as the knee, before and behind.

These marks are not characteristic of pregnancy, as they occur with abdominal tumors and where there is a sudden increase in fat, e. g., young girls at puberty. Unusually rapid growth of the long

bones, may cause them, at the epiphyses. Schultze found them in 36% of cases not pregnant and 6% of men.

The connective tissue of the cutis and subcutis tissue is stretched, sometimes torn, and the lymph spaces are arranged in parallel lines. When they are old they become white like a scar and show a fine folding. Some patients have many striae, some few. Blondes usually a little more likely, still colored people have them. The striæ are usually mostly below the navel and seem to form circles around it. When they are on the thighs they converge toward Poupart's Ligament. Not aways due to pregnancy. May be sequel of typhoid.

Changes in the Breasts.

These are developed as early as the third month of embryonic life. There are several tubular glands around the position of the future nipple.

In the fetus at five months, the glands exist simply as a collection of ducts which open at one spot. These are branched blind ducts from which the different lobules of the gland are later formed.

In the new-born child the ducts divide two or three times, but no true acinous structure is formed till puberty, when the acini are developed from the tubules at the periphery of the gland.

During pregnancy the change is still more marked, the acini being formed all through the gland.

The development of the mammæ in girls is very slow till puberty, then it takes new life. Each of the preliminary tubules becomes changed into a racemose gland, and thus the breast comes to be made up of distinct lobules. These empty by ducts on the surface of the nipple, which has become somewhat prominent. Before, it existed often as a little depression. The nipple is quite vascular, pigmented and has unstriped muscular fibres at its base, which when irritated, contract, throwing the nipple into a state of erection (suitable for suckling). There are fifteen to twenty of these openings on the surface of the nipple, the opening being smaller than the duct.

The fine milk ducts have an enlargement before they open on the surface of the nipple, the *sinus lactiferus*.

After pregnancy has occurred the changes take a new start and as early as the second month are quite marked. The breasts increase in size and sensibility, the nipple becomes more erectile, the veins enlarge and are seen as blue streaks, especially at the periphery of the gland. Striae gravidarum develop. The areola around the nipple becomes more deeply pigmented, called the "primary areola." Little prominences previously not marked now appear here, they are tiny milk glands which are called tubercles of Montgomery.

Sometimes around this primary areola, a second areola is formed which is not so deeply pigmented. Looks like water sprinkled on

dusty paper. The clear spots are due to a lack of pigment around the openings of the sweat and sebaceous glands.

The gland now begins to secrete a clear watery fluid with a yellowish admixture, called colostrum. May be pressed out, but sometimes comes alone and may prove annoying to the patient.

The blood supply of the gland is derived from the internal mammary, the inferior thoracic, the acromio-thoracic and intercostal branch.

The internal mammary artery divides, sending off the superior epigastric, which in turn anastomoses with the deep epigastric, and this with the external iliac artery.

The veins are collected into a circle around the edge of the gland called the "circulus Halleri," and empty into the axillary vein.

After labor the glands suddenly take on the most active operation they have yet done, and this we will consider at the proper time (puerperium).

The mammary gland may be considered a modified gland of the skin resembling the sebaceous glands. Sometimes we find an extra mammary gland below the ordinary gland. Sometimes one is found on the back or thigh.

This is called polymastia and is very rare. The left gland is usually larger than the right.

There is the belief derived from embryologic studies that man had at one time a line of glands running from the axilla down on the abdomen, like some of the lower animals. Accessory glands and nipples are almost always found on this line.

Up in the axilla there is often a piece of mammary gland which swells and becomes painful when lactation starts. This is often mistaken for a lymphatic gland, but is really a prolongation of the mammary gland. It needs no treatment.

CHANGES IN THE MATERNAL ORGANS.

General Changes.

Mauriceau says pregnancy is a disease of nine months' duration. That there is some truth in the statement, no one will deny. Generally, however, the pregnant state and labor are looked upon as physiological, and often this is used as an argument for non-interference. Still there is no other function of the female that is attended with such dangerous possibilities, therefore, while looking on the function as physiological, we must always bear in mind that at any point it may become pathological, and perhaps fatal to either or both mother and child.

A pregnant woman ought to feel as well as during the non-pregnant state. In a large per cent of the cases they do, or even feel better, but often they are not so. They are more irritable; their character changes; they are less trustworthy; they are less tidy; they have various aches and pains, neuralgia (toothache), headache and innumerable symptoms which the doctor is called upon to alleviate during the nine months in which she is carrying child. Sometimes severe mental disturbances arise. Every organ in the body feels the stimulus of pregnancy.

The Changes in the Blood.

These have been differently described at various times. Formerly believed that the blood was watery, a decrease in the red and white blood corpuscles occurring. Was called the hydremia of pregnancy, or "serous plethora" (Kiwisch). Many theories as to the causes of various conditions of the pregnant state, and of accidents to the pregnant state (e. g., eclampsia) were based on this supposed condition of hydremia; but this assumption rested on clinical grounds only, new instruments of precision dispelling it.

While in the first few months of pregnancy there may be slight reduction in the reds, and increase of the whites, the system soon reacts to the necessities imposed by the pregnancy and there is an increase of the reds, also of the whites, the latter out of proportion to the reds. (The "physiological leucocytosis of pregnancy." Virchow.) In the latter half of pregnancy a true plethora exists. The need for more blood must be admitted; the addition of the fetus and the fetal circulation, the development of the uterine arteries and veins, the enlargement of veins of the lower extremities, so

that they hold a great deal of blood. It would seem that they act as reservoirs to compensate for the loss of blood at labor. The loss of a pint, sometimes, to a quart of blood after labor, usually makes no symptoms. Women gain absolutely in weight in the latter half of pregnancy.

The amount of hemoglobin is increased in proportion to the number of reds. The amount of albumen is decreased. Alkalinity of the blood is increased. In weak, poorly nourished women, especially those women that are poor, working in factories, a condition of chloro-anemia develops.

In the latter half of pregnancy the fibrin is increased to about one-third more in amount than in the non-pregnant state. The probable use of this is to favor thrombosis in the vessels after labor and thus prevent hemorrhage. Thrombosis sometimes occurs in the legs, or in the pelvis before labor. Leopold says that clotting occurs in some of the vessels at the placental site before labor. Occasionally a piece of one of these thrombi becomes dislodged and gets into the lungs, when sudden death may occur.

The blood-making organs take on an increased activity. The thyroid enlarges and becomes more vascular. The enlargement decreases after labor, but never to its former size. The thyroid is said to have a bearing on toxemia and eclampsia (Lange).

The spleen increases in size, perhaps one-fourth of its original weight, from 140 to 180 grams. Lumbar glands enlarge.

On the inside of the skull there are deposits of reddish plates, composed of triple phosphates—calcium salts—really of bone. Occur mostly along the middle meningeal artery and the longitudinal sinus. Every pregnancy, a new layer, so that one can count the pregnancies in favorable cases, by the number of layers. May occur in the pelvis also. Called by Rokitansky "Puerperal Osteophytes." Supposed to have some function for the blood or for the nourishment of the fetus. They are about 1 or 2 mm. thick, and occur in about one-half of cases. Not characteristic of pregnancy, since they sometimes occur in syphilis, tuberculosis, chronic hydrocephalus.

The changes in the circulatory organs are marked. The heart undergoes an eccentric hypertrophy, especially of the left ventricle. This point was first brought out by Larcher in 1827. There are several reasons for the acceptance of this theory.

I. The physiological need for more work by the heart, e. g.:

(1) The increase in the amount of blood;
(2) The new placental circulation;
(3) The increased intra-abdominal tension.

2. *Anatomical findings.* Blot said there is gain of one-fifth, especially left ventricle. This is not constant.

3. *Physical examination* shows the hypertrophy.

There is an increase in the area of cardiac dullness, but this may be explained by the fact that the anterior portions of the lungs retract somewhat and leave more of the heart uncovered. Said that diaphragm rises higher, and thus displaces apex upward, giving the appearance of an increase of cardiac area. There is often (one in four) a systolic bruit over the base of the heart; this is a so-called hemic murmur and disappears after labor. Has often been mistaken for an organic murmur. The pulse is harder, larger and often more frequent than in ordinary conditions. This agrees with the findings of the heart. This hypertrophy of the heart is not admitted by all authors. The venous pressure below the pelvic diaphragm is increased, above this, the arterial pressure is increased. Formerly said that the pressure of the gravid womb on the veins of the abdomen caused the congestion below, but this is not so. The congestion is due to increased *intra-abdominal tension.*

The uterus is a relaxed sac and does not press on the vessels any more than the intestines, which are of about the same specific gravity. Ascitic fluid is often of the same specific gravity as the pregnant uterus, and the uterus may be regarded as like this, as the level of the liquor amnii is liable to change. The congestion (venous) is shown by the varicose veins of the lower extremities, vagina and vulva, and the hemorrhoids. The edema perhaps comes from this.

In some cases of venous congestion, even pronunced varicosities develop long before the pregnancy is so far advanced as to cause an increase of the intra-abdominal tension. Related of a certain cook that she knew she was pregnant by the beginning of varicosities in the legs, which began as early as four weeks. Cause for this must be looked for in the vaso-motor system. These varicosities are not always due to mechanical causes. There is often some congenital anomaly of the veins brought out by pregnancy, or some special action in the pregnancy itself. It may be absent when one would expect it present and thus may be used in diagnosis. Writer had a case of carcinoma of the ovary, with a tumor blocking the pelvis and affecting the peritoneum, marked ascites. Ballottement was obtained and a diagnosis of pregnancy had been made. There were no varicosities, which is remarkable because the abdominal circulation was more disturbed than by a pregnancy. (Wm. Waager, 1901.)

Sometimes there are attacks of palpitation with a sense of suffocation. These are probably not due to hypertrophy, but to irregularity in the nervous mechanism of the heart, perhaps from a full stomach. Occur more often in nervous women. Regulation of the diet (non-nitrogenous), laxatives, generally cure the cases. Women not seldom have fainting spells during pregnancy. Sometimes they are real, with pallor and poor pulse. Sometimes hysterical. Some are due to toxemia, though what kind I do not know. They get well with regulation of diet and stimulating the emunctories.

The Lungs.

The anterior part of the diaphragm is pushed up. The chest is expanded, laterally, diminished anteriorly, and the whole thorax lifted up during pregnancy. The vital capacity is not decreased, however. In primiparae (see Vejas Volkman's Klinische Vorträge) it is a little less than multiparae, owing to lax abdominal walls in the latter. Breathing less diaphragmatic, more costal. More CO^2 excreted. The temperature is not changed, nor are its variations. At the end of pregnancy the uterus sinks, relieves the chest.

The Urine.

(See Von Noorden Path. des Stoffwechsels, page 136.)

Quantity increased about one-fourth. The solid constituents, however, for a whole day are the same, for a single specimen less, i. e., the specific gravity is low.

It is supposed that there is some hypertrophy of the kidneys, and reasoning from analogy, this is probable. A whitish pellicle sometimes forms on the urine after it has been standing for thirty hours, called Kyestein, but has no significance as to pregnancy, since it occurs in the urine of men. Amount of urea decreased.

Sugar is sometimes found in the urine, and has been ascribed to two sources:—

1. The breasts, lactosuria.
2. An increase of the glycogenic activity of the liver.

If the lactose is slight in amount and not attended with symptoms pointing to a disturbed nutrition, it is not bad, but favorable as meaning a good milk secretion. The relation of lactosuria to the determination of sex has already been referred to. Lactosuria occurs in about 16%. True glycosuria is occasionally found, but the sugar is minute in quantity. It should be looked upon as pathological, and the patient put under close surveillance.

Albumin is in a certain per cent of cases found in the urine during pregnancy. Schroeder says 5%. But taking all cases of albuminuria together, it will be as high as 30% (Palmer.) My own experience shows about 3%—about as much as is found in healthy people. Renal albuminuria is almost never normal in pregnancy, therefore, look on all cases with suspicion. Sometimes find a few white blood cells and red blood cells; said even that occasional hyaline casts are not pathological; their occurrence, nevertheless, warns us to watch carefully. Albumosuria occurs in 25% of pregnant women (Fischel) in small quantities. Said to come from the liquor amnii. The urine of healthy pregnant women is not so poisonous as that of non-pregnant women under the same conditions of diet, etc. Deduced from this that toxines are stored

up in the blood. Chlorides increased. Phosphates and sulphates decreased (used by the fetus?).

Skin.

(See Montgomery, Diag. P'g.)

Increase in the subcutaneous fat. Pigmentation occurs at the places where fetal folds joined, e. g., the linea alba becomes a linea nigra, navel grows darker. The nipples, the vulva, sometimes the face, brow and each cheek have a dark brown pigmentation which is sometimes speckled. This last may be very marked and is then called the "mask of pregnancy." Nervous women, or women suffering from uterine disease, sometimes have it. It is called "chloasma uterina." There is also sometimes noted a discoloration of the eyelids, which may be of three kinds.

1. Venous congestion;
2. A deposition of pigment in the rete, and
3. A kind of Stearrhea Nigricans, where the pigment can be wiped off (rare). These pigmentations disappear after labor, but if they have been marked a trace often remains. The pigmentation is due to slow circulation at the site of the junction of folds, due to narrow capillaries. Some authors say a hypertrophy of supra renals. (Awaits post mortem proof.) Easier to say it is neurotic.

The red blood cells break up more easily during pregnancy and this may account for ease of pigmentation. (Ahlfeld.)

Brunettes are more affected than blondes. Hair takes on an increased growth which usually disappears after pregnancy. Hair may fall out after pregnancy. The sebaceous and sweat glands increase in activity, and these favor in untidy people pityriasis versicolor. The finer features of the face are made coarser, the patient has a florid face often, is liable to flushing. Esbach has determined a thinning of the nails.

Bones.

The bones become vascular, but undergo no changes. The changes of the pelvic joints, already mentioned. The spinal column is straightened, due to the center of gravity being changed, owing to the tumor in the abdomen. The small of the back is sharply curved.

This gives the patient a peculiar gait or strut. The shoulders are thrown back, the head erect, the feet thrown out straight ahead; called by Shakespeare the "Pride of Pregnancy."

There is a diminution of the lime salts if not sufficiently taken by the mother in the food. Teeth earliest affected, therefore old saying, "Every child a tooth." Said that fractures unite poorly in pregnancy.

Prevalent idea that if *lime* be left out of food, the child's bones

will be softer and labor easier. This is true only to a slight extent, but is dangerous for the children, as they frequently develop rachitis.

Digestive Tract.

Salivary secretion is increased. Sometimes there is "cotton spitting," i. e., expectoration is frothy; perhaps the salivation becomes pathological and needs treatment. Teeth easily become bad, sometimes cavities develop, due first to the alteration in the secretions of the mouth, dentists say.

Second, the demand of the fetus for more calcareous salts. The salivation begins about the sixth to the eighth week and lasts till the third or fourth month. Occasionally persists. Gingivitis of a mild degree is not uncommon, may become pathological.

The Morning Sickness.

Often early in pregnancy, sometimes as early as the second week, or third week, patient has nausea and vomiting and usually continues till the fourth month, sometimes later. This occurs in the morning, often on an empty stomach, or after breakfast, seldom after the other meals. It occurs so often as to be considered normal. Mostly in primiparae, but not rare at all in multiparae. The patient has the nausea on raising head from the pillow and may vomit some sour mucus. Any sudden motion may cause it. It is similar to seasickness.

Should the vomiting be after meals, and recur more than once during the day, or there be a constant nausea, the case belongs to the pathological and will be considered in the pathology of pregnancy.

Cause is obscure. Probably a reflex from the uterus. Occurs more in the higher classes of society. Vomiting may recur in the later months of pregnancy, just before lightening, due to displacement of intestines and the stomach. This ceases after head has gone into pelvis. But the vomiting at this time may be due to uremia. Be watchful.

The Taste.

Is often perverted, patients having a desire for unnatural things, such as chalk, slate pencils, herrings, etc.; called "*Pica.*" Case where a woman craved the flesh of her husband and killed him and ate him, and salted part of him down (Barnes.)

Appetite.

Usually increased, unless nausea occurs, even then, after the vomiting, appetite very good; sometimes women feel acute hunger.

The Stomach.

Digestion generally is not so active as normal, but may be more active. HCl may be increased and may cause *"heartburn."* This is relieved by antispasmodics, e. g., K. Br. and alkalies. The stomach wall is congested and pours out watery secretions.

Liver.

According to Tarnier, 1857, there occurs a fatty infiltration of the lobules from around the *intra-lobular* vein. By this he explained the Glycosuria. This occurs in 50% of cases. Not proved. Sometimes find multinuclear cells supposed to come from the placental site, and villi in the liver; said to be one cause of eclampsia. (Schmorl.)

Intestines.

Patient is usually constipated, due to:—

1. Laziness and general inactivity;
2. Uterine tumor interferes with the bearing down efforts during defecation;
3. Displacement of the intestines;
4. Perhaps inhibition of the nerves.

Hemorrhoids are common from the constipation and from the increased venous pressure below the pelvic diaphram.

Nutrition.

The body weight increases in the last three months according to *Hecker* and *Gassner;* seventh month, 2,400 grams; eighth month, 1,690 grams; ninth month, 1,540 grams. Due to increased assimilation and a patient must gain one-thirteenth of her body weight during pregnancy. The increase comprises blood, fetus, etc., and the fatty structures. The hips round off and become broad, the breasts have more fat.

This is a store of potential energy put away for conversion into heat and force during labor, and milk during lactation.

If the fetus dies, the stimulus falls away and the gain in flesh does not occur, perhaps even loses weight. A sudden loss in weight in the latter months of pregnancy is perhaps due to the death of the fetus, and this fact may be used in the diagnosis of the death of the fetus.

Nervous System.

Women are more impressionable, sometimes melancholy, sometimes gay, sometimes *a change in the character of women* occurs. They are often sleepy, especially after meals, and often sleep eighteen hours a day. May be one of the early symptoms of pregnancy. Sometimes hysterical disorders, perhaps a sort of fainting

spells which alarm the friends, but are not dangerous. Examine the heart and investigate diet and excretions. A true psychosis may develop. *Morally* unreliable; perception not so acute, and interpretations often false; therefore, careful in judging the acts of pregnant women. Not reliable witnesses. Often nervous and hyperexcitable.

Nerves.

Changes occur only in the genitals. The great cervical ganglion grows to twice its usual size, and the nerves of the uterus hypertrophy; no changes in the spinal cord, save an increase in the reflex irritability.

Liable to numerous reflexes, through the sympathetic system, e. g., vomiting, indigestion, flushes.

Neuralgias.

Facial, toothache, sciatic pains; headache, but perhaps this is due to deficient excretion. Any persistent headache must make you think of toxemia. Sometimes disturbances of the senses, e. g., Hemeralopia, amaurosis, hardness of hearing, but perhaps these are pathological.

Thus it is seen that pregnancy affects the whole body of the woman. No organ but takes part in the process. More work is required of every tissue, and if some part is not in good health, pregnancy develops this fact. "Gestation tests the integrity of every structure of the body" (Barnes). Organs in the ordinary state of health, working to a satisfactory degree, may under the stimulus of pregnancy prove insufficient and even develop processes decidedly pathological and dangerous. The normal and pathological are thus brought close together and we shall see in the pathology of pregnancy that pathological conditions are often only exaggerations of the normal, induced by gestation.

General Description of the Ovum at Term.

The embryologist has followed the ovum in its development from the earliest period, and it is unnecessary and impossible for us to repeat it. The ovum at term (the end of pregnancy) presents for examination: (1) The placenta; (2) The cord; (3) The membranes; (4) The liquor amnii; (5) The fetus.

The Placenta is a cake-like organ and weighs (average of 1,492 placentae), 501 grams. Placentae from large children are heavier, from syphilitic children heavier than from healthy children of the same weight. The placenta is 1½ to 2 c. m. thick and 15 to 18 c. m. broad. It is irregularly round, but may assume any shape, trifoliate, or double, as in some apes; further, for example, may be extensive and thin, or small and thick. The tissue of the organ

is dark red, soft, friable, but woven with tough fibrous tissue and blood vessels. The placenta lying on the wall of the uterus, presents for examination the side directed to the uterus, the maternal surface, and the side toward the fetus, the fetal surface. The maternal surface is dark red, and close inspection will show it to be covered by a thin, grayish membrane which will not be peeled off, but tears away. The surface is broken by depressions (sulci) more or less deep, some with the sides adherent and showing, when separated canals lined with glistening endothelium (blood sinuses). These sulci divide the placenta into little lobes varying from ½ to 3 inches in breadth, called cotyledons, of which there is a varying number.

The thin gray membrane covering the cotyledons is that part of the decidua serotina which came away with the placenta. It is broken here and there; there are small pieces absent; it is thicker in places and may be quite opaque (marked in cases of endometritis). At the rim of the placenta this decidua is quite thick (the relics of the closing plate of Winkler), and by scraping into it, somewhat into the tissue of the placenta, one may see a large sinus, like those referred to, called the marginal or circular sinus, which may be followed all around the edge.

The fetal surface is uneven, gray and reddish, sometimes dotted with whitish or yellowish areas of tough fibrous tissue. These are called white infarcts and are of very common occurrence.

The cord is inserted in this surface of the placenta and the arteries and veins from it run over the surface of the placenta, dividing and subdividing till the smallest branches disappear about ¼ inch from the edge. This surface is covered by a thin membrane, the amnion, which is easily stripped off all over except at the insertion of the cord, where it is fast. Near the insertion of the cord can sometimes be found (usually adhering to the amnion), a small yellowish vesicle, the remains of the umbilical vesicle.

Structure of the placenta. About the fifth week the ovum looks like this, covered with tiny tufts, which have grown into the decidua serotina and reflexa, but are only loosely attached to same. These tufts are called villi. Each villus consists of an inner layer derived from the endochorion, and an outer epithelial layer from the exochorion; each villus contains an artery, a plexus of capillaries and a vein. These vessels are developed from the vessels

which the allantois brings to the periphery of the ovum about the second week. The first villi are simple tubes, but as the ovum grows they become more branched and at term are closely interwoven like trees.

While the villi that are in contact with the decidua serotina multiply and grow exceedingly, those on the decidua reflexa atrophy, because there are no blood vessels. That part of the chorion which lay against the decidua reflexa and whose villi atrophied, is called "chorion laeve," that part which was against the serotina, and whose villi increased so markedly is called "chorion frondosum" (placenta). Some of the villi, dip deeply into the decidua and spread out a little like buttons, so-called anchoring villi.

The placenta is made up of these villi closely packed together and thousands in number. In order to expain the structure of the placenta let us proceed as follows:

The arteries from the child arriving at the placenta divide and subdivide into many fine twigs. From each of these twigs a "tree" of villi hangs.

Imagine a thousand tiny trees grasped by their trunks, the branches and leaves interlacing closely. Inside the villi the blood circulates, in the arteries, capillaries and veins. These villi are surrounded by blood (of the mother), which is circulating in spaces called lacunae. These lacunae are formed thus:

The vessels of the uterus at the placental site lose their coats and are developed into large passages lined with a layer of endothelium and called sinuses. These sinuses go through the decidua serotina, into the sulci, between the cotyledons, and from here open into the spaces (lacunae) into which the trees of villi dip.

Schematically the placenta is represented thus:

The minute structure of the villi has been much disputed. About the middle of pregnancy the villus consists, from without inward, of (1) a layer of syncytium (which, it is generally admitted now, comes from the epiblast or trophoblast); (2), next a layer of cells or Langhan's layer, also from the epiblast; (3), the stroma of the villus, mesoblast; (4), the wall of the blood vessel inside the villus. Later in pregnancy, the syncytium thins out, the layer of Langhans atrophies.

The lacunae, or intervillous spaces, are lined with maternal endothelium for only a short extent. If it lined all the surface of

the spaces it would be found on the villi. The blood floats free around the syncytium, and may be said to be outside the maternal vessels.

Very recent studies (by Veit and others) tend to show that the syncytium produces a toxin, and the tissues an anti-toxin. This toxin is said to have something to do in the production of eclampsia An anti-syncytio-toxin serum has been prepared. (See Eclampsia.) No real proof as yet.

There is no communication between the blood flowing in the lacunae (maternal) and the blood flowing through the villi (fetal). Therefore, the interchange of water, food, salts, etc., must be by osmosis. Solid particles, e. g., microbes, do not pass over unless there is some destruction of the walls of the villi, which they may cause themselves.

Ahlfeld injected emulsionized fat into the vessels of the mother; none could be found in the fetus. Saenger proved that in leukemia of the mother, no white blood corpuscles were in the fetal circulation. The blood from the various lacunae is collected by large veins which pass through the decidua into the maternal veins. The large circular sinus collects a great deal of blood. One can see these veins, and sinuses on the placenta between the cotyledons.

The placenta is well formed by the tenth week; it grows at the rate of 100 grams a month to the seventh month; 60 grams in the eighth, 40 in the ninth, and 6 grams in the tenth. It is located generally either on the anterior or posterior surface of the uterus; sometimes on the sides. More often on the right side, more often anteriorly. Ahlfeld, in eleven Caesarean Sections, found it nine times in front; Schroeder, fifty-five cases, thirty-eight times anteriorly; rarely attached to the fundus. May be inserted low in the uterus, and if it overlaps the internal os, we speak of placenta previa. Reason for these various insertions not known; perhaps due to varying posture of the woman when the ovum entered the uterus, or condition of health of uterine mucosa.

The separation of the placenta during labor occurs in the ampullary layer of the decidua, at the expense of the mother.

The Membranes are continued all round the edge of the placenta. We distinguish an inner, transparent, thinner, tougher layer, the amnion, and an outer, thicker, cloudy, somewhat opaque, friable layer, the chorion, or chorion laeve, in distinction to the placenta, which is the chorion frondosum. On the maternal surface of the chorion, patches of more or less thick decidua are adherent. The two layers are easily separated; sometimes there is a jelly-like substance between them, relics of the allantois, the jelly of Wharton. The chorion is never vascular, but sometimes one can see vessels in the decidua adherent to it. If large and heavy, they indicate endometritis. At some point there is an opening through

which the fetus passed. This is usually 10 c. m. from the edge of the placenta, but perhaps nearer if the placenta was situated low in the uterus.

The Umbilical Cord connects the fetus with the placenta. In the second week a growth takes place on the lower end of the intestinal tube, which goes out of the abdominal cavity, carrying on it two veins and two arteries coming from the primitive aorta. This is called the allantois. Part is constricted in the belly to form the bladder, the part that grows out, strikes the periphery of the ovum and spreads out on it. The elements of the allantois grow into the chorionic villi and carry into them the artery, vein and capillaries.

In the human fetus the allantois forms only a small part of the abdominal pedicle (His). At first the amnion surrounds the cord, but is not attached to it. Later the liquor amnii pushes the amnion against the inside of the chorion. The cord therefore is the end stage of the abdominal pedicle. It is covered with several layers of epithelium, being somewhat similar to that covering the fetus. The cord at full term is a spirally twisted organ (usually from right to left), and is inserted in the belly of the fetus at the navel. It is 50 to 53 c. m. long, but this varies much—from 7 to 110 c. m. There may be one-fourth to several hundred twists in it. Cause is the movement of the child and the direction of the growth of the vessels.

The cord may be inserted at any point in the periphery of the ovum, but the normal site is about the center of the placenta, and the insertion is brought about in this way. The allantois appears at the abdominal opening of the fetus as a stalked vesicle. The amnion about this time has closed and now the development of the two folds: head and caudal begins. The vessels of the allantois will, of course, grow most where there is the most nutrition; therefore, at the placental site. The belly of the baby is usually turned toward the decidua serotina, so the vessels have a straight course from the baby to the placenta. Should the baby have its belly directed toward the decidua reflexa, the stalk of the allantois will strike there first and the vessels would insert there if the following did not occur. The head fold of the amnion develops usually faster than the tail fold. This has a tendency to swing the head around. The amnion, striking the stalk of the allantois, forces this around till the fetus lies with its belly opposite the placenta. (See Ahlfeld.)

Should the development of the amnion folds be such that the stalk of the allantois is not swung around to lie on the placenta, the future cord is inserted at that point of the periphery of the ovum where the allantois is arrested. This may be away from the center of the placenta (eccentric implantation of the cord), at the

edge of the placenta, (marginal insertion, sometimes called battledore placenta), or more or less far from the edge of the placenta, in the membranes (velamentous insertion).

The cord is made up of:

(1) Covering of epithelium.
(2) Two arteries and one vein (one atrophies), placed thus.
(3) Relics of the omphalo-mesenteric duct.
(4) Remains of the allantois.
(5) Jelly of Wharton.

This last binds all the structure together. If large in amount, we speak of a fat cord; if small, a lean cord.

The arteries are continuations of the hypogastric arteries; the veins of the umbilical vein. The arteries are twisted around the vein, and they are also twisted on themselves. Vein also. As a result there seem to be valves in the vessels; called valvulæ-Hobokenii. Arteries have a strong middle coat which has something to do with the arrest of hemorrhage at birth. They anastomose near the placenta.

At the skin of the child is a sharp line of demarcation. A few capillaries from the skin go up on the cord for one-eighth of an inch. There are no vaso-propria, therefore, the cord must receive its nourishment from the blood passing in the arteries and veins. No nerves have ever been demonstrated in the cord.

The cord may form *knots*. False, True.

False Knots are merely irregularities or varicosities in the course of the vein, e. g., surrounded with the jelly of Wharton.

True Knots are knots of various complexity, occur once in one hundred and fifty cases; may be single or double knots, tightly drawn or loose. Factors favoring true knots are active child and long cord, large amount of liquor amnii.

Knots form during labor, often. A coil of cord lies on the bottom of the bag of waters, the head passes through this, or an arm may be slipped through and the body follows. Knots formed during pregnancy may cause the death of the fetus. In these cases there is a structural change at the point of constriction. Not so in those formed during labor. Must demonstrate the cord to be impervious before you can use it, as explaining the death of a fetus.

A knot may form around a limb of fetus, but latter dies first from interruption of circulation before the limb is constricted.

The Liquor Amnii.

This is the fluid by which the fetus is surrounded. It is about 1,000 grams in amount on the average, but varies normally between 500 grams and 2,000. Anything over 2,000 is polyhydramnios, or hydramnion; below 500 is oligohydramnion. Amount diminishes toward the end of pregnancy. About the seventh month one some-

times finds a great deal of liquor amnii, but this diminished later. Cause for this?

It is a clear white fluid, more or less full of suspended particles of Vernix Caseosa, which is composed of fatty matters and cast-off epithelial cells, and the lanugo. It is more or less milky. Early in pregnancy it is clear. Later in pregnancy it is less so, due to the suspended matters, fatty, lanugo, scales. If fetus dies it gets blood stained from transfusion of blood pigment. If fetus becomes asphyxiated it becomes green, due to meconium admixture (lack of O stimulates intestine of fetus). Alkaline reaction. Specific gravity may have something to do in determining presentation and position of child (DeLee). Specific gravity 1006 to 1012, which diminishes as pregnancy goes on.

The cryoscopic point (freezing pt.) of the liq. amnii is higher than that of the fetal or maternal blood. Therefore, generally speaking, the liq. amnii is destined to be absorbed. (Keim, before Paris Obst. Socy., in 1901.)

Albumin is present but in varying amount; according to Prochownick, from 0.6% to 5.2%, at the end of pregnancy. More albumin at the middle of pregnancy, then decreases. Has the same proportion of salts as blood serum, *i. e.*, 0.5%, about.

Sodium.	Sulphate.
Calcium.	Phosphate.
	Carbonate.

Urea—Important Finding.

Prochownick found an increase in the amount of urea as the pregnancy went on so that at term the per cent was .23%. French authors place it at .42%. Ahlfeld observed a case 31 days, where liquor amnii was being discharged, and found the amount of urea so small that it could not be measured. Said that there is urea in eggs; fetus must secrete it. (Barnes.)

Bondi, C. f. G., 1903, page 636, found pepsin, a diastatic ferment, sometimes a fat splitting ferment and a ferment like the fibrin ferment in the liq. amnii.

Sources of the Liquor Amnii.

Quite important and interesting subject. In general there used to be two hypotheses, one that it is from the mother; second, from the fetus; but now, recognizing that really in the beginning everything comes from the mother, these two theories have been joined, and it is believed that the liquor amnii comes:

(1) Directly from the mother by transudation through the amnion.

(2) Through the fetus by way of the skin, the urine (?) and the fetal placenta.

In favor of the first theory may be adduced:

(1) When K. I. is given to the mother, it will reappear in the liquor amnii, even when the fetus is dead. (Haidlen.)

(2) Sometimes the fetus dies and we find a large placenta with more liquor amnii than is normal at that period.

(3) When mother has heart disease, or any disease attended with dropsies, likely to find increase in the liquor amnii.

In favor of the theory that the liquor amnii comes, at least in part, as a urinary secretion from the fetus, we have:

(1) The constant occurrence of urea in the liquor amnii.

(2) The demonstration from pathological formations of the fetus, e. g., obstruction of the urethra and ureters, that the kidneys secrete urine.

(3) The occurrence of urine in the bladder at birth. Ahlfeld has strongly opposed this view, and asserts that normally the fetus only exceptionally urinates into the liquor amnii, and that the liquor amnii is a transudate from the maternal blood vessels or through the skin of the fetus. Part of the l. a. is a transudate from the fetal structures in the cord and placenta, as demonstrated by the polyhydramnion in cases of fetal heart disease.

The fetus drinks the liquor amnii a great deal, and it forms a part of his daily diet.

Uses of the Liquor Amnii.

1. Food. Proven by:
   - (a) The finding of lanugo in the meconium has proven that the fetus drinks the liquor amnii. Further, real swallowing motions have been determined in the fetus.
   - (b) A case of occlusion of the gullet, the fetus was atrophied.
   - (c) The liquor amnii contains albumin constantly, and if he drinks enough will get a considerable amount of albumin.

2. As a water cushion preventing injury and allowing free motions of the fetus; this prevents deformities, e. g., club foot.

3. Prevents the amnion from adhering to the fetus and causing deformities, e. g., hare lip, hemicephalus, amputations, imperfect closures of the body cavities; all arrests of development due to strands of amnion. Amniotic bands cause a large number of congenital deformities called Simonart's bands.

4. During labor it helps dilate the passages by forming a fluid wedge with the membranes; (2) washes out the vagina for the passage of the child, and (3), surrounding the fetus completely, it distributes (as all fluids do) the compression exerted by the contracting uterus, equally in all directions, and thus saves any part of the

fetus from injurious pressure. When the liquor amnii has been discharged, the fetus is exposed to this pressure, and if it is long continued, may succumb from it. Extreme moulding of the fetus may result from an empty uterus.

The fetus increases in specific gravity toward the end of pregnancy, especially its head, whereas the specific gravity of the liquor amnii decreases. This has a tendency to allow the head to sink, and a favorable vertex position produced. Recently Schatz (C. F. G., 00-01), denies this, saying breech is heavier end.

The Fetus at Term

lies folded together in the uterus with all the joints flexed, so that it occupies very little space. Head flexed on chest, chin touches sternum, arms folded on chest, thighs on abdomen, legs on thighs. The umbilical cord passes out from the belly to the wall of the uterus, its coils usually lying in the hollow made by the juxtaposition of the extremities. The back is sharply curved, like the letter C, and lies applied to the uterine wall. The length of the fetus in this position is about 50 c. m. and it weighs about 3,200 grams.

Signs of Maturity.

(a) Length 50 c. m. about; some babies short and broad, others long and thin.

(b) Weight 3,200 grams, but this is fallacious, as a fetus may be mature, yet small and thin. Boys heavier than girls.

(c) Hair is well developed, perhaps 3 c. m. long. Lanugo almost gone. Some children are almost bald at term. Others, premature, have long hair.

(d) Nails protrude beyond the fingers and to the ends of the toes. It is said (Negri, Ann., de Obstet., June, 1885), that if the foot is 8 c. m. long, baby weighs 3,500 grams.

(e) Panniculus Adiposus well developed. Premature infants are thin and look like old people, having thin skin and wrinkled.

(f) Cartilage in ear well developed; therefore, ear is elastic and stands out well from the head.

(g) Navel is at the middle of the belly (from symphysis to ensiform), two or three c. m. below middle of body, higher in girls than boys.

(h) Testicles are both descended. In girls, labia majora almost always cover the minora.

(i) Vernix Caseosa well developed; varies.

(j) Color of the skin; white or pink means maturity, red occurs in prematurity.

(k) The milia and comedones around the nose have usually disappeared.

(l) The osseous center of the lower end of the femur is 7 to 8 m. m. broad.

(m) Manifestations of life:

1. Voice: loud, ripe, whimpering, in early born.
2. Sucking movements strong, weak in early born.
3. Passage of meconium, early and frequent in mature children; late in premature.

But not one of these signs is absolute. The best is the length of fetus. Seldom in a position to say that a given fetus is premature; can only say that there is a high degree of probability.

If the fetus presents the signs of maturity well marked, can say that it is mature, but cannot say that it is the result of a 9-months' pregnancy, as a mature child can be born at 8 months. (See Parvin.)

The size and development of the placenta and cord are unreliable, as indices of maturity of the fetus. If the decidua bordering on the placenta is vascular, may be premature, if endometritis can be shut out.

Ahlfeld found scratch marks on the inside of the amnion, made by the fetus after the nails had grown beyond the finger-tips.

The evidence of life on the part of the fetus forms an interesting and instructive study. Aside from the fetal heart sounds, the direct palpation of the heart through the abdominal walls, the fetal or umbilical souffle, all things which will be considered at length later, there are palpable and audible evidences of life.

The fetal movements are the longest known. One can distinctly see the extremities move across the uterine wall, and there are stretching movements. These may be jerking or distinct kicks. Then the fetus often stretches out, the mother appreciating this as a sort of knock of the breech against the fundus.

Hiccough has frequently been diagnosed. They are short, periodic, two or four seconds apart, jerking motions of the shoulders or breech, attended with a visible and audible thump against the abdominal wall. They resemble hiccough in everything except noise; and in one case I observed the hiccough before delivery and after the delivery, inside of a minute, the child was hiccoughing audibly. Have been observed by the writer as early as the 5th month. May make the diagnosis of pregnancy.

Respiratory movements of the chest of the fetus can, in favorable cases, be seen by observing carefully the naval region of the mother. These movements are not deep enough to bring the liquor amnii into the lungs, but serve to develop the chest and chest muscles; they are 60 to 70 in the minute. If you can observe a child that has been just delivered, you will notice before the gasp, which fills the lungs with air, these tiny respiratory movements; and in children that

have been deeply asphyxiated, the return to life is evidenced by the beginning of these faint respiratory movements.

Babies certainly swallow in utero, as was said before, but no one has diagnosed the movement. And they suck their thumbs sometimes, as one often sees a new-born child put his thumb in the mouth; in one case reported, the thumb was swollen from sucking. Babies presenting the face in delivery will suck the finger of the examining hand.

THE PHYSIOLOGY OF THE FETUS.

For our purpose, this study is useful only after the fifth month. The changes from the vitelline circulation to the omphalomesenteric, the introduction of the allantoic circulation at the second week, and the final disappearance of the omphalomesenteric circulation about the fifth week, upon the establishment of the placental circulation, need only to be mentioned. They were learned in embryology.

Blood.

Has about the same appearance as maternal blood, but has less fibrin and hemoglobin. Red blood cells are more easily decomposed. More reds in boys than girls. Find nucleated reds up to the ninth month, after birth rarely find one. White blood cells more than the mother. Umbilical vein has more than arteries, therefore, since none can pass over from the mother, the placenta must be a place where white blood cells are made. Hemolysine has been found in fetal blood. Münch. Med. Woch., 02, No. 12. No diastatic ferment. (Bial Pflugers, Archiv., No. 53.)

Total quantity of salts, about the same as maternal.

(See C. F. G., 1895, No. 15. London Obst. Soc. Rep.)

(See Limbeck on the Blood.)

The alterations in the fetal blood explain the following conditions:

1. Icterus neonatorum.
2. The tendency to hemorrhages from all sources.
3. The liability to septic infection.

Circulation.

The hypogastric arteries branch off from the common iliacs and pass through the navel in the cord to the placenta. They carry part of the blood in the fetus to the villi in the placenta, and here it passes through the capillary network. Right alongside of it is the arterial blood of the mother circulating in the lacunae or intervillous spaces. The blood from the arteries is quite venous in character, but becomes oxygenated by oxygen passing over from the ma-

ternal blood. The blood is then returned to the fetus through the umbilical vein and distributed, as you learned in anatomy and physiology.

The placenta is, therefore, the organ for the oxygenation of the blood; in other words, it is the respiratory organ of the fetus, and this is so, because:

1. If it becomes detached the fetus dies of asphyxia. The fetus makes respiratory movements and gets liquor amnii in its lungs, really drowns. Same occurs if umbilical cord is compressed.

2. Zweifel has seen in certain mammalia (dog, mare), the arteries with venous blood and the vein with arterial blood.

The fetus needs very little oxygen, as its combustion processes are very slow, it moves little and meets with no resistance; it has no perspiration and evaporation from the skin; very little digestion. It loses no heat. Since this is so, the fetus tolerates withdrawal of its oxygen supply for a time very well, *i. e.*, asphyxia. As pregnancy goes on this toleration is lost. It is believed the fetal blood is more and more venous as pregnancy goes on. The process by which the fetal blood carried to the placenta becomes oxygenated is probably analogous to the process going on in the lungs.

The *placenta has other functions* (Respiration, 1).

II. It provides food for the fetus, especially *water*. All substances *in solution* which do not destroy the integrity of the maternal blood, pass on to the fetus through the membrane, separating fetal and maternal blood, e. g., salts, K. I., salicylic acid, etc. Gases pass over, e. g., chloroform, and CO_2; therefore, the danger of giving too much $ChCl_3$. Ahlfeld found the liquor amnii in many cases of Cesarean Section, stained with meconium. It is bad for pregnant women to go to large gatherings, or where large coal stoves are used, as the CO may injure the fetus.

III. It receives the products of decomposition of the fetus and the maternal blood carries them away to the excretories.

IV. Placenta has the function of storing Glycogen (See R. D. & LeP., page 103).

V. Believed that the Chorionic villi have some peptonising power which changes albuminoids into peptones, and thus makes them diffusible through the membrane separating the fetal from the maternal blood.

VI. The placenta offers a mechanical barrier to the passage of germs. Only so, however, if placenta is intact. Recent investigations tend to disprove this.

Bar & Renon. Rev. Mens des mal. de l'enfance, Nov., 1895, found the blood of the umbilical vein in two cases of tuberculosis of the mother, fatal to guinea pigs.

Freund & Levy, Berl., Klin. Wochenschrift, 1895, No. 25 (ref. in above), found the typhoid bacillus in the blood of the fetus in a case

of typhoid. Still, there may have been lesions of the boundary wall, *i. e.* the covering of the villi, caused by the bacilli themselves.

If the bacteria do not pass, the toxines do, and may produce lesions in the fetus.

The child has its own metabolism, but it gets its nourishment in a condition ready for immediate assimilation. There is great excess of accretion over excretion, as very little matter is found in the intestines and the skin and kidneys are inactive. The temperature of the fetus is ½ degree C. higher than the mother. This is proven in breech cases.

Nutrition of the Fetus.

1. From the blood in placenta.
2. From the liquor amnii.

The *liver* is active,—demonstrated by the presence of bile in the meconium. The meconium is a tarry, greenish-black substance, found in the colon of the fetus in considerable quantity even before the seventh month. It accumulates in the colon and, therefore, there is peristalsis of the intestines, which has also been demonstrated experimentally. The meconium becomes thicker in the latter weeks as the intestine is absorbtive. Meconium is composed of secretions of the intestinal canal, the solid particles swallowed with the liquor amnii, lanugo, epithelium, vernix caseosa and bile. Chemically, cholestearin, bilirubin, fat and mucin.

The *stomach*. There is a little pepsin and milk curdling ferment, from the fifth month on.

The *kidneys*. These are active from the early months, as Nagel has shown. The liquor amnii is partly urine, though this is disputed by Ahlfeld. He says the excrementitious matters which the kidney usually excretes are taken away through the placenta. Still, urea has been found in the liquor amnii, the bladder has been found distended, even so as to be a hindrance to labor, the kidneys are there, and, by *analogy with other organs, must work*. Urine is often found in the bladder of new-born children. They sometimes urinate freely during delivery.

We know little regarding the assimilation of the fetus. Water, salts and diffusible albuminoids are absorbed from the placenta. We do not know how the fetus gets fat, unless it makes it from the albuminoids. Until the second month, the fetus is almost all water, has more water even than milk. At the end of pregnancy the fetus is 74% water.

The Growth of the Child.

It is important to know how a fetus grows, especially to be able to determine if a given pregnancy can safely be interrupted. The size of the child is then determined by examining it from the outside. The length of the child gives us the safest guide.

TABLE.

					c. m.	Weight. grams.
4	weeks	(head	to	sacrum)	0.8	
8	"	"	"	"	2.5	
12	"	"	"	"	8.0	35
16	"	"	"	"	16.0	41
20	"	"	"	"	23.0	222
24	"	"	"	"	36.3	1142
28	"	"	"	"	40.4	1635
32	"	"	"	"	45.1	2107
34	"	"	"	"	48.3	2424
36	"	"	"	"	49.9	2806
38	"	"	"	"	50.5	3016
40	"	"	"	"		3168

A simple rule to determine the length of a fetus at the several months of gestation, is this: square the number of the month which will give the length in c. m. of the fetus. After the 5th month add 5 c. m. for each month.

For example, at 3 months the fetus is 9 c. m. long.

at 5 months the fetus is 25 c. m. long
at 6 months the fetus is 30 c. m. long, 25+5.
at 7 months the fetus is 35 c. m. long, 25+5+5, etc.

Both length and weight of children vary. Some babies grow faster than others. Some at term or over are small and puny, which may be due to general poor constitution of mother, or her poor development. Women with generally contracted pelvis (indicating arrested development), have usually small babies. (See LaTorre.) Large muscular women have large babies, same true if father is large and strong. Fat women have more often small babies. Good nourishment or poor has a little to do with the development of the child. People of better classes have slightly larger infants than the needy poor. Therapeutically, we try to influence the growth of the child by regulating the mother's diet (more later). White children are larger than negro children. Children of different pregnancies vary in size. As a rule, they get larger after the first. One observer said the second child smaller than the first, then they are larger successively. After the seventh or eighth child, they decrease in size. This is due to the shorter length of later pregnancies, or perhaps nutrition not so good. The reason for the progressive increase in size,—perhaps larger placenta. Girls are smaller than boys—3 or 4 oz.

If child is carried over term, it overgrows, or its head gets harder—shoulders broaden. These changes not invariable. If pla-

centa is diseased or unusually small—child is small, e. g., syphilis, nephritis, endometritis, infarcts. General health of mother sometimes has an effect on the size of the child. Occasionally find craniotabes.

DIAGNOSIS OF PREGNANCY.

A certain diagnosis is not always possible. A high degree of probability can always be reached. Mistakes without number have occurred, and by good men, also; almost always the result of carelessness or of prejudgment. Greatest difficulty in the first four months, but sometimes throughout pregnancy. Socrates said, in studying ourselves we must "Lay aside *prejudice, passion and sloth,*" and let this be your motto in making a diagnosis of pregnancy. Sometimes the signs are so apparent that a diagnosis can be made at a glance, but occasionally you will be mistaken even here, and the laity who think that a diagnosis in this matter is always easy, will lose faith in the doctor. In uncomplicated cases, *i. e.*, where it simply rested to determine whether pregnancy did or did not exist, oftener pregnancy diagnosed where it did not exist, than was an existing pregnancy not recognized.

When the diagnosis was to differentiate some *pathological* condition simulating pregnancy, from a pregnancy, the pregnancy was oftener missed. A great many different conditions can simulate pregnancy, and the effects of a mistake are often disastrous to the patient, either physically or socially. (See Montgomery.)

Sources of Error.

1. In the early months there is no absolute sign of pregnancy.
2. In later months the only absolute sign is the fetal heart tones and these may be not audible at time of examination, or fetus may be dead.
3. On the part of the mother various hindrances may be present.
    (a) A very fat woman, or ascites or ovarian tumor or fibroid.
    (b) A rigid abdominal wall and vagina, natural or voluntary and intentional.
    (c) False statements.
        1. Intention to deceive. Wants you to pass sound for diagnostic purposes: Girl unmarried, tries to hide it from friends.
        2. Self-deception: Sometimes woman so desirous for a child that she imagines a pregnancy—"pseudcyesis." Women have even gone in labor, imagining themselves pregnant, and having pains.

Signs are divided into (1) *Subjective* and (2) *Objective.*

Subjective, those that the patient tells us, sometimes called *Rational.*

Objective, those that we feel, see, hear,—sometimes called *Sensible.*

First have but little value because of above reasons, and are at best presumptive. The latter are to be given more credence, and are probable or certain. This is another division of the signs.

Presumptive; Probable; Certain.

For the purposes of study, we will divide the pregnancy into three periods of three months each, *i. e.,* three trimesters.

Signs of the first trimester: Subjective.

I. Cessation of Menstruation—Important, but must answer certain qualifications:

(a) In a woman previously regular.
(b) No pathological cause for amenorrhea.
(c) Must persist as long as the pregnancy lasts. Value of sign increases as pregnancy advances.
(d) Nothing pathological must result from it.

Still, certain fallacies likely to occur, since a pregnancy can occur in the absence of menstruation, e. g., (A).

1. Before menstruation in a girl. "Fruit before flowers."
2. During the amenorrhea of lactation.
3. After menstruation has ceased, menopause.

(B) Pregnancy may be accompanied by one or two menses. Sometimes when the conception took place shortly before a period, there may be a few drops of blood during the period. The next period is absent. Still one regular period may occur. Cases where menstruation has persisted during pregnancy are not authentic. They can be almost always ascribed to some pathological condition of the uterus. Some women claim that they menstruate throughout pregnancy. When nothing pathological results from this and no other cause for the flow exists, (if there is a flow), which is not always so, even if the woman asserts it, it may be menstrual. Personally, I do not believe a normal uterus menstruates after the second month of pregnancy. Better to consider them pathological. The pathological conditions which can cause a flow during pregnancy are:

(a) Rupture of a varix, at any point of the cervico-vaginal-vulvar canal.
(b) Diseases of the endometrium (which is not obliterated till fourth month), as endometritis, which is not rare in pregnancy.
(c) Cervical erosions.

(d) Uterine polyp.
(e) Diseases of the ovum; placenta previa; myxomatous degeneration of chorion; chronic abortion.
(f) Extra uterine pregnancy.

(C) Other conditions can cause cessation of menses:

1. Change of climate, return from a sea voyage (noticed in girls coming from Europe). Seldom persists over three months.
2. Mental effects. A girl who has exposed herself to conception may have a cessation of menstruation and not be pregnant, from actual fear.
3. Pathological conditions.
   (1- Syphilis; (2) Tuberculosis; (3) Anemia or secondary anemias from tuberculosis, etc.
4. Sometimes women are irregular, often being amenorrheic for several months without apparent cause. During lactation menses often are irregular. There are sometimes long intervals. True, also, at the approach of the menopause.

You are safe in regarding a woman who is menstruating regularly as *not* pregnant. (Schroeder.) As a general rule, the sudden cessation of menstruation in a woman who *can* conceive is a fairly sure sign of conception. Cessation of menstruation, then, is only a presumptive sign of pregnancy. It is valuable, however, in fixing the date of conception, so as to determine the time of labor, and must always be noted for this purpose.

II. *The morning Vomiting or Sickness.*

This begins usually after the fourth week, but may show itself earlier—case quoted from Montgomery, where, at the end of the week after marriage, patient felt squeamish. If the nausea is limited to a certain period of the day, mostly the morning, is not attended with symptoms of disease, comes on in a woman who can conceive and who previously was well, it is highly presumptive. Good to remember this point in the differential diagnosis of all indigestions, in young women. Together with cessation of the menses is very presumptive, but not certain. Vomiting occurs earlier in primiparae and more constantly in them. Multiparae, later and less severe. May be absent in both, especially so with people of the lower classes. Sign is of value, as it makes the diagnosis of the life of the fetus probable. In cases of pathological conditions complicating pregnancy, it is quite useful.

III. *Symptoms* of a sympathetic or reflex nature.

(a) Salivation. Begins about the fourth week. Called "Cotton spitting," by Dr. Dewees. When sudden in its onset, unattended with fetor ex ore or other sign of mercurialism, is of some value. Pinard describes a mild gingivitis that may occur during pregnancy,

and may even become pathological, with loosening of the teeth, hemorrhage from the gums, but usually does not do so. (See Parvin, 1895.)

(b) Ringing in the ears, neuralgias.

(c) Change in the disposition, feeling of being pregnant, etc. These are all unreliable, especially the latter two, since they occur in women not pregnant, and may be marked, especially when the woman believes herself to be pregnant and wants a child. Still, when a multipara has missed a period and says she feels that she is pregnant, it is highly presumptive (but not certain).

IV. Irritability of the bladder, not due to weight of uterus on it, but to stretching of base of bladder, due to a marked anteversion of uterus. Uterus same specific gravity as intestines, therefore can't press on bladder. May be marked in the first few months, then when the uterus goes up into the abdomen ceases, late in pregnancy begins again. No value at all in diagnosis.

Objective Signs. First Trimester.

A. Thoracic Genitalia, the breasts. B. Pelvic Genitalia, uterus, vagina, vulva, connective tissue.

I. *Mammary Glands.* As early as the fourth week there may be tingling in the breasts and enlargement; at the twelfth week, a little colostrum can be pressed out from numerous fine orifices.

Sebaceous glands increase in activity and the epithelial scales can be scraped off, branny scales. This is sebaceous secretion which hardens on the skin. Pigmentation begins in the primary areola; later the secondary areola forms and is valuable in diagnosis. In brunettes the areola may be almost black. Secondary areola resembles dusty paper on which water has been sprinkled.

Nipple more erectile, enlarged, more sensitive.

Primary areola is enlarged, becomes puffy. Said can feel milk ducts radiating from the nipple.

The glands of Montgomery develop and can feel and see them as hard nodules. By many they are regarded as milk glands (accessory); said that sometimes can trace canal connecting with the sinus lactiferus. Of interest in that they may become atria of infection during pregnancy, and lying-in period. A milky secretion may often be pressed out in a fine stream. The glands increase in size from periphery to center. Growth may cease at the fourth or fifth month, but takes on a renewed activity toward the end of pregnancy. In old primiparae the activity may not occur at all, or not till the second week of the puerperium. (Rare.)

Linea albicantes (*i. e.*, striae gravidarum) sometimes develop near the periphery, and blue veins may be seen coursing under the skin. Most important of these points are, puffiness and pigmentation of the primary areola, and colostrum.

These signs are more marked in a primipara. Of very little significance in a multipara, because, first, they are not so marked; second, traces from the previous pregnancy remain; third, in multiparae often between pregnancies there may be colostrum in the breasts. Signs least marked in an old multipara. Aside from these fallacies, we must observe:

1. Some women, especially nervous women, have pain, tingling and enlargement of the breasts during menstruation.

2. May have these breast changes with pathological conditions of the genitalia, e. g., ovarian cyst, hematometra, fibroids (reflex symptoms referred to the breast).

The enlargement of the sebaceous glands, named after him, was considered by Montgomery decisive, but this sign is not infallible.

John Hunter attached significance to the sign also. Nor is the secretion of milk decisive. Baudelocque tells of a girl who, at eight years, suckled her own baby, and in Africa, with certain tribes, young girls suckle children, the glands being stimulated by drugs and friction (Tanner). Men have nursed children.

3. Prostitutes may have a secretion of colostrum.

4. Masturbation may cause changes in the breasts similar to those of pregnancy. The sign, therefore, has only presumptive value, but toward the fifth month the changes may be so marked as to make the diagnosis highly probable, but then we have better signs.

May serve to draw our attention to the possible existence of a pregnancy. During lactation a sudden diminution of the quality and quantity of the milk is strongly presumptive of a new pregnancy. This shows itself in the nutrition of the baby also.

B. *PELVIC SIGNS.*

II. *Discoloration of the vulva, vestibule and vagina,* and softening of the vagina. The vulva becomes softer—darker in color. Vagina soft and thick and dark blue in color, sometimes violet. Change most marked just below the meatus urinarius and then on the anterior vaginal wall. The vestibule is a little prominent, and the meatus somewhat pouting. Due to increase in the venous circulation and congestion of the growing uterus. *The vagina is softened early and is an important sign.* Begins in primiparae as early as the sixth week; almost always present at the tenth week, but still may be but slightly marked at the eighth month. This discoloration and softening of the vagina varies much.

Sometimes even at term the vaginal outlet presents a pink color, in other women it may be deep purple. All grades between. In multiparae sign is more constant, and may be seen as early as the third week. The softening is almost always present, but in rare instances it is slightly marked even up to the fifth month. After this some softening always exists.

Fallacies.

1. May develop very late.
2. May occur with anything that causes pelvic congestion.
   (a) Rapidly growing tumors (pelvic) of all kinds.
   (b) Displacement of the uterus.
   (c) Inflammation in the pelvis (causing chronic congestion).
   (d) In multiparae the vagina remains softer than normal between pregnancies, if they follow each other quickly.

Sign is useful in fat women and can almost always be elicited. Of presumptive value only. The softening is of more value.

III. *The Leucorrhea.* This begins often as early as the first period missed, and may continue all through the pregnancy. Almost every case has leucorrhea toward the end of pregnancy. It may be marked—even pathological, but here some previous disease must have existed. Has no diagnostic importance. The symptom may bring the patient to the doctor, *i. e.*, she complains only of leucorrhea. A tough mucus plug in the cervix is also of diagnostic significance.

IV. *Softening of the Vaginal Portion of the Cervix.* Due to same causes as the softening of vagina, *i. e.*, congestive hyperemia of the pelvic vessels due to the activity of the growing ovum. Softening begins from below and goes upward, and in primiparae may be felt as early as the sixth week. In multiparae as early as the fifth week. Some change always by the twelfth week.

The lower third, softened at twelve weeks.

The upper third, softened at eighteen weeks.

The middle third, softened at twenty weeks.

General comparison of *Goodell*:

"If the cervix feels as hard as the cartilage of the nose, no pregnancy; but if the cervix feels like the lip, pregnancy possible."

Fallacies.

Same as those simulating the softening and discoloration of vagina, *i. e.*, all conditions which produce pelvic congestion, e. g., rapidly growing tumors, inflammations.

Further, in chronic endocervicitis, and chronic cervicitis, the cervix may be so hard that the softening during pregnancy is inconsiderable. Value is only probable, not certain.

V. *Hegar's Sign*, or softening and compressibility of the lower uterine segment.

Elicited by passing two fingers in the anterior fornix and by bringing the external hand down on them through the lower uterine segment, or the finger may be put into the rectum, and the thumb in the vagina, under *ether*. First method best; the finger inside seems to meet the hand outside with just a little uterine tissue

between them. The body of the uterus is soft, the cervix in its upper portion still hard, but the lower uterine segment is the softest; sometimes may be compressed to the thinness of paper. This is due to the irregular growth of the uterus. Occurs as early as the sixth week in multiparae—occurs at the eighth week in primiparae.

Is quite diagnostic of pregnancy but not certain. One of the most reliable signs of the first trimester. May be simulated by retroflexions of the uterus or congestion, may be simulated by a small fibroma in the wall of the uterus. It may be slightly marked, or even absent, and because of fat or rigidity of the abdomen, may be hard to elicit. It may persist for a variable period after an abortion or a labor, even months. Danger of abortion, according to Parvin, if compression too great. Have felt it under many conditions of the non-pregnant state.

VI. *Changes in the Form, Size, Consistency and Position of the Uterus.*

(a) *Form.* The virgin form of the uterus is like a thin pear. When the ovum first develops, the body increases in its anterior—posterior diameter. Later the sides round out and then the uterus is spherical. Can feel the bulging above the cervix from the vagina —finger in each fornix. Sometimes one-half of the uterus will develop; sometimes a groove may be felt around the ovum.

These changes were considered already. (See physiology of pregnancy).

(b) *Size.* Uterus is 2½ inches long, ¾ inch thick and 1¼ inches in width. Body enlarges to size of a big fist at the end of the third month, or better, size of a fetal head.

The regularity of the growth is important. In doubtful cases examine every two weeks, and one can determine a certain increase in size. This needs large experience, but is positive, as the same rate of growth is shown by no other tumor. If the uterus, instead of increasing in size, should remain stationary, or even decrease, the ovum is dead. Sometimes the uterus may increase rapidly in size, and go back again. Peculiar phenomenon and needs study.

(c) *Consistency.* Soft, elastic, spongy, characterize the pregnant uterus. Often at one point can feel a *harder resistance,* due to the ovum. Over this sometimes a groove, the vacant space between the decidua reflexa and vera. Only palpable under especially good conditions, e. g., relaxed vagina and thin abdominal walls, docile patient.

This softness is simulated by no tumor, except a soft myoma, which is very rare, and possibly hematometra. Often, even as early as the third month, one feels the uterus get harder (contraction), and an acute observer may feel the uterus harden in spots, under his finger (partial contractions). These findings are very important, but hard to elicit.

(d) *Position.* Uterus is strongly anteverted owing to its weight; it falls on the bladder. Feels like a lump of dough lying flat on the finger.

These four conditions, taken together, form a very probable sign of pregnancy in the first three months.

In the first trimester, there are no *positive* signs of pregnancy, but by combining all, one can arrive at a high degree of *probability.*

Examine systematically in the way I have laid down and carefully, not being satisfied with eliciting one or two signs. Bowels empty, bladder empty, not too near a meal, as the full stomach interferes with palpation. Lay aside all constriction of the abdomen. Patient should be on a rather high table. Often have to make the examination when patient is in bed; undesirable, but if necessary, put a small pillow under head, patient in oblique position, *i. e.,* one foot in bed, one on a chair (for internal examination). Disinfect the hands carefully, first, because you may infect the woman; second, to get the habit of obstetric cleanliness.

Notice the signs in order as given, because it makes a bad impression on the patient to put her back on the table, because you have forgotten something, and further, by pursuing a system you will not forget anything. When some of the pathological conditions mentioned in the lecture complicate a beginning pregnancy, the difficulty is really great and a good many diagnosticians have been foiled. The difficulty in arriving at the diagnosis should warn you to carefulness. Leave the diagnosis doubtful rather than be influenced to announce a probable condition as certain.

If the woman asks an opinion of you, you may lean in the direction of her desires. If she is anxious to have a child, tell her that it is very possible she is pregnant and she should consider herself so till she comes again in a month, when a positive diagnosis can be made. If she does not desire a child, tell her it is possible that she may not be pregnant; that she should not give herself any concern about it, but return in a month, when you can tell her certainly. This exhibition of tact is justifiable and will retain the confidence of the patient, and not interfere with her condition.

Under no circumstances prescribe any medicine as a placebo to satisfy her desire for an abortifacient.

REVIEW OF SIGNS OF FIRST TRIMESTER.

I. *Subjective, or Rational.*
   (a) Cessation of menses, presumptive.
   (b) Morning Sickness, presumptive.
   (c) Reflex symptoms—feeling pregnancy, salivation, neuralgias, presumptive.
   (d) Irritability of the bladder.

II. *Objective, or Sensible.*

(a) Changes in the breasts, presumptive.
(b) Discoloration and swelling of the vagina, vulva, presumptive.
(c) Leucorrhea, presumptive.
(d) Softening of vaginal portion of cervix, probable.
(e) Hegar's sign, if marked, probable.
(f) Changes in form, size, consistency and position of the uterus, highly probable.
(g) Determination of a regular rate of growth is positive, but requires several examinations.

Diagnosis of Pregnancy, Second Trimester.

The Second Trimester is marked usually by a subsidence of the sympathetic signs (e. g., vomiting, salivation), and an increase of the mechanical, while new signs make their appearance.

Menstruation continues absent. One new subjective sign appears, *i. e., active fetal movements.*

About the sixteenth to the eighteenth week the woman begins to feel something in the abdomen entirely unlike any previous sensation. It takes her a week usually to determine what it is, and finally she concludes it is the movement of the child within her. She is usually beset with various emotions, especially if this be her nature, and she immediately feels the full glory of maternity.

Now she is "quick with child." It is called "quickening," and law now recognizes the woman as pregnant. All fears she may have entertained about her pregnancy vanish; she looks forward hopefully to her labor, when she can be a real mother. There is a certain maternal instinct which serves, among other things, to propagate the race, but is not very long-lived; because, after having satisfied the longing for offspring once or twice, the woman usually wishes no more. A certain German philosopher calls it egotism, saying it is quickly satisfied, and after that the men and women refuse to be "population machines."

In multiparae the movements may be recognized as early as the fifteenth week. Primiparae, later; as they do not know what the phenomenon is. Have been likened to the movement of a little bird fluttering in the closed hand; the movements undoubtedly begin much earlier than they are felt, which is owing to their feebleness.

About this time, also, the uterus comes to lie on the abdominal wall, and thus the sensations are better transmitted. They are weak at first, but later stronger, and may in certain cases be so severe as to keep the patient awake. As this is felt by the woman the sign is only of presumptive value, as it may be simulated by peristaltic movements of the intestine, by contractions of the recti

muscles, by a tumor in the abdomen falling from one side to the other, or from nothing at all,—the woman simply imagines the sensation.

B. Hicks believes that there is some relation between the aeration of the blood in the maternal sinuses, the movements of the fetus and the intermittent uterine contractions, as follows:

The circulation stagnates, CO_2 accumulates in the fetal blood, the child kicks, strikes the wall of the uterus, this causes a uterine contraction and the blood is squeezed out of the uterus; uterus relaxes, new blood flows in. Supported by the fact that in intrauterine asphyxia the child makes many movements, e. g., when ergot is given (this causes a prolonged uterine contraction).

The movements are felt most on changing the position, when the woman wakes up in the morning. Hunger causes an increase in the movements. Chloroform a decrease. It is certain that the baby has periods of activity and periods of rest, though we have little proof of them. Some women can tell when the baby wakes up, as he "stretches himself," so the women say. The movements are due to the stretching motions of the back and flexing and extending the extremities.

Sign is useful in determining the date of confinement, and get date of labor. Have the woman note its occurrence, reckon *ahead* twenty-three weeks for a primipara and twenty-four weeks for a multipara. It acts as a check on the date of last menses.

The Objective Signs of the Second Trimester.

These are highly important. Whereas the diagnosis in the first twelve weeks was only a probable one, you are now usually able to assert positively whether the woman is or is not pregnant. Even now sometimes it is impossible to tell, and may have to wait till end of pregnancy.

I. *The Intermittent Uterine Contractions.*

First investigated by Braxton-Hicks; sometimes called after him. By Schultze called "Schwangerschaftswehen." Can be felt from the tenth to sixteenth week, and persist till the end of pregnancy; every five to twenty minutes the whole uterus will slowly contract, take a more pear-like form, harden, when it slowly relaxes to its original form. These contractions are elicited by rough palpation or cold hands. They are *intermittent, painless,* not usually perceived by the mother.

Function. First, they act like a local heart squeezing the blood out of the uterus; when this relaxes, the blood can flow back. The circulation in the maternal sinuses is very slow, and it is probable that this is the way it is changed.

Second, the contractions force a certain amount of blood into the cervix and vagina. This is especially true during labor itself.

It is called *Vital Dilatation.* It makes the parts soft and easily stretched.

Third, later in pregnancy they cause the fetus to assume a position favorable to labor and keep it from changing its position. Only effective to a small extent in multiparae.

Causes of the contractions:

1. The fundamental contractions peculiar to all unstriped muscular fibre exist in the non-pregnant uterus and are evidenced by the expulsion of a tumor in the uterus, e. g., the extrusion of a fibroid.

2. Some relation between the movements of the fetus and the contractions, as explained above.

3. External stimuli bring on contractions.

When the contractions become more frequent and painful, they indicate labor beginning. A woman may have painful uterine contractions for weeks and sometimes months before her confinement. These produce no dilatation of the cervix and thus differ from true labor pains. This phenomenon is due usually to a neurotic temperament. When felt by the obstetrician they are a very certain sign of pregnancy, but they can be present (not so rapid or pronounced) in:

1. Soft fibroids.
2. Hematometra.
3. Contractions of the recti muscles sometimes imitate them.

Can all be eliminated; the sign is, therefore, a positive one, and may be found irrespective of the life or death of the fetus; are elicited easier the nearer the woman is to term.

II. *Active Fetal Movements,* felt, seen or heard by the physician. We have already considered the movements as felt by the patient. When determined to exist by the doctor, this is a *certain sign* of pregnancy, of the life of the fetus and also later in pregnancy of the position of the fetus. Are felt as early as the fourteenth week by a skilled observer. A gentle tap against the hand, later a distinct kick, or a thump if the hand is near the breech and the fetus suddenly stretches or hiccoughs.

Pinard has listened to the sounds and finds that they can be heard as early as the twelfth week. Two sensations, like a gentle tap against the ear or the stethoscope, the other a sound like a gentle stroke on a tense membrane.

Place hand with palm over your ear, then gently tap the back of the hand with index finger. Sound is identical with fetal movement.

Later in pregnancy can see the movements, either a sudden jarring of the abdominal wall or a limb can be seen traveling across the abdomen.

III. *Passive Fetal Movements, i. e.,* owing to the mobility of the fetus in a relatively large amount of liquor amnii, we can give

certain movements of the fetus, called Ballottement, or, Re-percussion.

The sign is elicited in two ways, internal and external Ballottement.

First method: Two fingers in the vagina; hand on abdomen; give the body felt in the uterus a gentle tap. There are three perceptions; first, that of the body leaving the fingers; second, that of the body striking the other side; third, that of the return of the body upon the fingers. The first and last almost always felt; second may not be appreciated.

Second method: Place the woman on the side of the bed so that uterine tumor hangs over; one hand on each side of the uterus. Same procedure. Less certain than the first.

Get Ballottement from the sixteenth to the thirty-second week. Before the sixteenth week, fetus too small; liquor amnii too much, and walls too thick; after thirty-second week, liquor amnii too little, fetus too large.

A skillful palpator can perhaps feel Ballottement earlier than the sixteenth week. Ballottement gives no information as to the life of the child.

Fallacies. It may be simulated by the following conditions:

1. Anteverted uterus floating in ascitic fluid.
2. Small fibroid or ovarium tumor in ascitic fluid (long pedicle).
3. Stone in the bladder.

Care should exclude these and the sign becomes one of high diagnostic significance, really positive.

IV. *Direct Palpation of Portions of the Fetal Body.* You may feel extremities, called small parts, or head or breech, called large parts.

Many tumors have a nodular contour, and may simulate a fetus very much. Case in Berlin where second twin suspected, but it was only three fibroids.

Lumps of feces have led careless observers astray. Carcinoma of peritoneum. Tumors of the omentum. But the sign depends for its value on the skill of the observer and may thus attain a high diagnostic significance.

Can distinguish fetal parts as early as the fourth month sometimes. In a case of pregnancy where one ought to feel parts of the fetus distinctly, the absence of them leads to suspicion that the ovum is blighted, or that there is hydramnios.

V. *Auscultation.*

The signs obtained by auscultation may be *fetal or maternal. The fetus* gives certain auscultatory signs of life, such as the *heart beat,* sounds of fetal movements. In 1818 Mayor, of Geneva, described the fetal heart tones, but published his paper where few saw it.

In 1821 Lejumeau de Kergaradec, ignorant of Mayor's article, published an extensive paper on this sign, which is classical even now.

Surprising that the sounds were not heard sooner, but then, with the exception of a few points about auscultation, given by Corvisart, nothing was known about auscultation, even of the adult heart, till Laennec published his book in 1819.

Mayor was looking for the sounds to be made by the fetus splashing around in the liquor amnii. Kergaradec, also, was not looking for the fetal heart tones when he found them.

The fetal heart tones can be heard as early as the fourteenth week, but usually the time is put at the eighteenth week; always at the end of the fifth month.

Vary in intensity. At first faint, later strong. If large amount of liquor amnii, they are weak. If child lies with its back to abdominal wall, they are heard more distinctly. Cases differ in intensity. The stronger the fetus, the stronger the sound. The thicker the uterine and abdominal wall, the less the intensity. If the placenta lies in front of the fetus, heart tones may be faint or inaudible. Other sounds, as the uterine bruit, or rumbling of gas in the mother's bowels may cover up the fetal heart tones.

Up to the fifth month place the stethoscope on the linea alba (or the linea nigra, as it is sometimes called), about 8 c. m. from the pubis; after the fetus is palpable, place the stethoscope where the heart is anatomically located, *i. e.*, the anterior or posterior aspect of the fetus.

Three Methods of Auscultation.

I. Naked ear.
II. Monaural stethoscope.
III. Binaural.

Naked ear is not good, because many accessory sounds; rubbing of beard, circulation in middle ear from constrained posture; further, disagreeable to the patient and to the doctor. In noisy place, better than stethoscope.

The Monaural stethoscope offers the advantage that it is clean, easily portable, easily handled, especially during operations (can be wrapped in a gauze sponge), and after a little practice gives good results.

The Binaural stethoscope is the most certain, but it is harder to carry, harder to disinfect, hard to handle during an operation. During auscultation nothing must touch the instrument save the skin of the mother and the ear of the doctor. Pressure with the fingers causes a faint hum which often completely covers the sounds. If you must hold the stethoscope on the abdomen do so with two rubber bands.

Characters of the Fetal Heart Beat.

It resembles the "tic tac, tic tac" heard from a watch placed under the pillow. Tic—short pause, tac—long pause, tic—short pause, etc. The first sound, as in the adult is isochronous with the systole of the heart, and also with the pulse in the umbilical arteries. The second sound or tac is isochronous with the closure of the semilunar valves.

Rapidity: Normally varies from 120 to 150 per minute. Above or below these figures points to some pathological condition, if constant. Frankenhäuser said that the sex of the child could be determined from the rapidity of the fetal heart tones. He said that when the tones were below 135 per minute it was a boy; above 145 a girl; between the two, either. Wilson has studied the point and finds the rule quite successful. General opinion of observers is that no relation exists. My own experience has led me to believe that there is little, if any, truth in the theory. In general, the larger the child, the slower the beat; the nearer the end of pregnancy, the slower the beat. As boys are usually somewhat larger than girls, perhaps something in it. A certain doctor who had a reputation for predicting the sex of the child did thus: he asked the patient what she wanted; if a boy he told her it was a boy, and immediately wrote down in his book, "Mrs. X. will have a girl." After the child was born, if a boy, he said nothing (possibly "I told you so"); if the family said he was mistaken, it being a girl, he referred to his book and showed that he had made a note that it would be a girl.

Temperature of the mother increases the beats. Uterine contractions slow, then later they get faster. Fetal movements accelerate them. Rapidity varies from hour to hour. During fasting they are made rapid and may cease. Threatened asphyxia makes them rapid and irregular.

The fetal heart tones are the most reliable sign we have for the diagnosis of pregnancy. Nothing simulates it. The mother's pulse is 72 except in fever, etc., and then the *intensity* will differentiate (*i. e.*, move your stethoscope nearer the mother's heart and the sound will increase in strength). Feel the pulse while listening to the fetal heart tones.

They show, further, the life of the child, and thirdly, can be used to diagnose the position of the fetus. They show also if the fetus is in danger. An increase persistently above 160 is suspicious. A persistent decrease below 100 is suspicious.

Fetal Souffle.

This is sometimes called the funic souffle, or umbilical murmur; in German, the Nabelschnurgeräusch. It is a soft, blowing murmur, heard with the heart tones, synchronous with the systole of the

fetal heart (sometimes with both sounds). First heard by Kennedy, in 1833. Has its origin in several places.

1. In the cord, when this is too short or too long, or is coiled around the neck, or is lying between the back and the stethoscope, or when the cord is inserted into the membranes, or if there are knots in the cord.

2. Due to anomalies of the fetal heart, e. g., perforate septum, regurgitation of tricuspids, vegetations on the valves. Thus you may be able to diagnose heart disease in the fetus, if the sound is marked, constant in place and rhythm (intensity varies). Heard in 14 to 16% of cases examined (Winckel says 75%), but occurs later than the heart tones and never without them, so is of less importance than they. Was formerly thought to be a sign of fetal asphyxia, but this idea is not entertained now. Still, if you hear it low down near where the neck ought to be, be on your guard, for coils of the cord, and you may get a dead baby. It is by no means diagnostic of coils or cord around the neck, merely suggestive.

When present, is a positive sign of pregnancy.

VI. *Maternal Auscultatory Signs.*

Kergaradec, in his paper, 1821, described a sound which he heard while listening at the sides of the uterus and he ascribed it to the rushing of blood through the placenta, calling it the *Placental Souffle.* It is a soft blowing sound, synchronous with the maternal heart, having a rushing character, similar to the bruit heard in an aneurism or in the veins of the neck, or like the French "vous" pronounced in a low tone—voo. During uterine contraction it is diminished or altered in quality, sometimes both.

Position.

Heard best at the left side of the uterus, low down, but may be heard on the right side or anteriorly, occasionally all over the uterus. or on both sides.

Intensity.

May be loud, drowning the fetal heart tones, or soft, hardly audible.

Occurrence.

Absent in some cases, present on one or both sides, at once or alternately. May be heard at one time and absent in the same place later, or may disappear while listening.

Character.

Humming, blowing, rushing, sibilant or even musical. May be continuous, or intermittent, or wavy. Is without shock and is usually single, but may be both systolic and diastolic. Sometimes may be intensified by pressure with the stethoscope.

Causes.

Various theories:

1. *Placenta.* Not here, as it can be heard after the placenta is removed. Can be heard where the placenta is not. Up to now no sound has been heard that can be attributed to the placenta, so that it is not possible to diagnose the position of the placenta by this sign.

2. *Compression* of the iliac arteries by the uterus. Not so because, first, it is heard at a time when the uterus could not compress the arteries (that is, the twelfth to the fourteenth week).

Second, in the knee chest posture, the sound is also heard.

Third, the specific gravity of the pregnant, non-contracted uterus is but slightly, if any, more than that of the intestines.

3. *Compression* of the epigastric artery by the stethoscope. Can be excluded (Glenard).

4. *Occurs* in the *puerperal* artery. Should be constant.

5. *Theory* of *Dubois.* The arteries enter the uterus and empty into large venous sinuses. They also are very tortuous. The murmur occurs here and is similar, therefore, to the murmur in a varicose aneurism; sometimes the fetus will compress a certain part of the uterus and then the murmur will be increased. Sound is heard as early as the twelfth week; Spiegelberg says, the sixteenth week, and is a probable sign of pregnancy. Occurs if the fetus is dead or alive.

Fallacies.

1. Rapidly growing uterine tumors have the same murmur.

2. Any pelvic tumor growing and causing greatly increased vascularity of the pelvis.

There are other sounds heard in auscultating the abdomen:

1. The maternal heart tones. When there is gas in the intestines the sound is conveyed thus, sometimes even to the pubes.

2. The tones audible in the arteries of the lower pelvis.

3. Borborygmus, which must not be mistaken for the fetal heart tones.

4. Muscular movements of the abdominal walls.

VII. *CHANGES IN THE FORM, SIZE, POSITION AND CONSISTENCY OF THE UTERUS.*

Form.

Uterus more and more globular. A symmetrical globular tumor; on each side can usually feel the round and broad ligaments hanging down. Can sometimes feel the ovary, especially the left, and it may be quite tender.

Size.

Uterus rises above the brim of the pelvis at the end of the third month; fourth month it is three fingers above the pubes; fifth month half way to navel; six month, at the navel. Growth is quite uniform in primiparæ, but one cannot use these points to determine the length of the pregnancy, because a full bladder, full rectum, hydramnion, etc., confuse. The size of the uterus at the different months of pregnancy varies in different women and remarkable as it may seem, in the same woman at different days or weeks of the month. In rare cases, the uterus may suddenly enlarge to the size of a uterus several months longer pregnant, and then as suddenly subside to its original size and form. Dr. O. Buettner, Centralblatt fur Gyn. in Aug., 1900, describes cases of this kind, also R. L. Dickinson, Am. Gyn. Soc'y, 1901.

The writer met one such case. Cause not known, likewise pathology. Uterus may grow unevenly, so that the ovum seems to be in one side only. Then, too, the uterus can alter its usual globular form. Ovum may be situated in one corner of the uterus.

Position.

Median symmetrical tumor, lying against the abdominal wall. The bladder in filling gets in front. Useful for diagnosis.

VIII. *Changes in the Skin.*

The stretching continuing, the linea gravidarum increase. The navel in the first months is drawn down, then becomes pouting; in the third three months is drawn up and when lightening occurs it becomes pouting again.

The presence of marked varicosities of the legs and vulva is significant of pregnancy, and the absence, if they have been marked at other times, is likewise significant. (See previous chapter.)

IX. *The Determining of the Rate of Growth of the Uterus.*

In an experienced hand this sign is positive. No tumor grows like it. Examine bimanually and note the size at intervals of two weeks. If the tumor doesn't grow, or gets smaller, the ovum is blighted.

SUMMING UP OF SIGNS OF THE SECOND TRIMESTER.

I. *Subjective.*

a. Menses absent; highly probable.

b. Active movements of fetus; probable.

II. *Objective.*

a. Painless uterine contractions; certain.

b. Active fetal movements felt by doctor; certain.

c. Passive fetal movements, ballottement; certain.
d. Direct palpation of fetal body; certain.
e. Auscultation, fetal heart tones, fetal souffle, fetal movements; certain.
f. Auscultation; uterine bruit; probable.
g. Changes in form, size and position of uterus; certain.
h. Linea albicantes and navel; presumptive.
i. Rate of growth of uterus; certain, in skilled hand.

SIGNS OF THE THIRD TRIMESTER.

No new signs develop.

Menses still absent.

Morning sickness absent, usually. There may be some sickness, but it is most often pathologic and you must direct your attention to the kidneys at the first sign of sickness in the last three months. Still it may occur from interference with the digestion due to the cramped position of the stomach.

Active fetal movements persist, may become so violent as to disturb the woman's rest, and this, too, without any assignable cause. Women usually feel these on one side, particularly that side where the feet are—is of no use to diagnose the position of the child. Just before labor the infant is quieter.

Objective Signs.

Re-percussion is limited to certain parts of the fetus unless there be a condition known as Hydramnion, i. e., increase of the liquor amnii, which gives a much increased mobility to the fetus.

Fetal heart tones are louder and more constantly heard in one place. Palpation of fetal parts is plain, and toward the end of this trimester is like that of labor.

Uterine bruit till the seventh month increases in intensity, after this remains about stationary.

I. *Changes in the uterine tumor*, however, are marked.

At the seventh month uterus reaches one-third of the distance from navel to the ensiform appendix; at the eighth month, two-thirds the distance, and at the ninth month about the level of the ensiform appendix. In primiparæ now the uterus sinks into the pelvis, i. e., the lightening. In multiparæ this does not occur till just before or during labor. Still in some cases occurs also in multiparæ.

The regular advance of the uterus, also, is only true of primiparæ, as owing to the loose abdominal wall of the pluriparæ the uterus can fall forward and cause pendulous abdomen.

Lightening before labor is attended with certain improvement in the symptoms. The breathing is easier, digestion better, not so much heartburn or palpitation. Still, the patient cannot get around as well, i. e., locomotion is hindered. Bladder symptoms exaggerated. Neuralgias in the lower extremities, from pressure on sciatic and obturator nerves. All due to the presence of the head in the pelvis and its pressure on the various structures.

Lightening has an important prognostic value. It means that the head of the fetus can pass into the pelvis and that there exists no disproportion between that particular head and that particular pelvis. As the inlet of the pelvis is most often contracted, the head in the pelvis shows that for this case the inlet is normal. In some cases the head passes out of the pelvis again and may be found at several examinations either in or out. Lightening may be absent in the following conditions:

1. Contracted pelvis. Where the inlet of the pelvis from one disease or another is smaller than normal, the head will not enter. Often during labor the head will not enter and this forms one of the most important obstacles to natural delivery.
2. In twin pregnancy, head does not engage till labor begins.
3. In hydramnion, i. e., increase in the amount of liquor amnii.
4. Multiparity.
5. Presence of the placenta in the lower uterine segment.
6. Occipito-posterior positions.

In primiparæ the non-engagement of the presenting head must make you look for something wrong, but you will not always find a contracted pelvis.

II. *Changes in the contour* of the abdomen in the last three months. The profile of the abdomen is a quite even curve till the head sinks in the pelvis, then, owing to the anteversion caused by the tension of the round ligaments, the fundus falls forward. The uterus sinks to the level it had at the eighth month, but the abdomen becomes more prominent. The waist measure is increased; the woman has to let out her skirts.

III. *In the last four weeks, also, changes* in the uterus' form take place. This is owing to the development of the lower uterine segment. The head passes into the lower part of the uterus, which, according to Schroeder, is from the body of the uterus, and according to Bandl, from the expanded and dilated supra vaginal portion of the cervix. The changes in multiparæ are not so constant. Lower uterine segment does not form till labor.

The formation of the lower uterine segment is caused by several factors, and may be part of the process of lightening.

1. The weight of the child.
2. The intermittent uterine contractions.
3. Action of round ligaments.
4. The tightness of the abdominal wall, and this is the reason that it is less likely to be formed in multiparæ than in primiparæ.
5. The presenting part is relatively immovable in the inlet. The fundus of the uterus becomes more flattened, less convex, due to:
   1. Entrance of the head in the lower uterine segment.
   2. Absorption of liquor amnii, which allows the uterine wall to apply itself more closely to the body of the fetus,

especially to the breech with the extremities doubled against it.

IV. *Changes in the Vaginal Findings.*

Up to the last three weeks, the cervix is felt as a soft, not easily outlined body in the vault of the vagina. Its conical shape can still be defined, but with difficulty, owing to its succulence. The finger can be passed half way to the internal os in primiparæ, but all the way usually in multiparæ, and in rare cases also in primiparæ. If the head has not yet gotten into the pelvis the cervical canal is directed backward, the cervix can be felt as such. Sometimes the cervical canal runs forward. If the head has gotten into the pelvis the cervix seems to be flattened out (usually called "apparent effacement of the cervix"). The canal is directed forward. The ordinary position may be recovered by traction on the anterior lip of the cervix.

THE DIAGNOSIS OF THE TIME OF PREGNANCY or THE PREDICTION OF THE DAY OF CONFINEMENT.

(See Winckel, Volk. Klin, Vort N. F., No. 292.)

For many reasons, on the part of the doctor and the patient, it is important to know the time of labor. The doctor may want to induce labor for contracted pelvis, or to admit the patient to the hospital. The patient wants to know so as to arrange her household affairs, to engage a nurse, etc. It is a matter of some moment to come within two weeks. But we cannot tell positively when labor will occur. There will always creep in a discrepancy of one to three weeks since the real duration of pregnancy is not known.

1. *The time of conception is not known.* Conception may have occurred after the last or before the first period missed.

2. The occurrence of labor is often accidental, i. e., it may be brought about by some little accident, e. g., going up stairs, a jar, a diarrhœa, or excitement.

3. Length of pregnancy varies with women, and in the case of same woman at different times. True of all animals.

Pregnancy varies from 240 to 320 days. French law recognizes as legitimate a child born six months after the marriage and 300 days after the death of the husband. But pregnancy may be prolonged over the usual time, reckoning according to menstruations. Since we have all these sources of error, mistakes are common and one's diagnosis, therefore, can only be probable.

The following points are used in the determination of the date:

a. The date of the fruitful or single coition. This may be known. Some women say they can tell when a coition is fruitful by a peculiar sensation at the time. No truth in it. Date of single coition

more likely, e. g., sudden death of husband, rape. Count 272 to 275 days or nine calendar months from this date.

b. The date of the commencement of the last menstruation, Schultze's rule, count back three months and add 7 days; e. g., May 16th—February 23rd.

Or count ahead 280 days from the commencement of the last menses. This is subject to fallacies (three weeks). There are many rules, calendars, formulae, etc., but they are all juggling with the same figures.

c. Date of quickening. If the woman comes to you before quickening, tell her to notice when it occurs and write down the date. Count ahead twenty-four weeks in multiparæ, twenty-two weeks in primiparæ. But sometimes quickening is felt later and again not at all, so little certainty; the sign has this value, however, that it acts as a check on the other dates.

Objective Signs.

1. *Size of the uterine* tumor, distension (circumference) of the abdomen, height of the fundus above the pubis, or the navel, or the ensiform, are very doubtful signs, as they may be affected by so many disturbances, e. g., fat or thin woman, tumors in the abdomen, hydramnion, full bladder and rectum, fetus transverse or a monster, twins.

2. *The size of the fetus*, more constant and the best guide, but more useful to the old practitioner. Two ways: one, *direct measurement* of the fetus by calipers, or Ahlfeld's method. He says that owing to its flexed posture the length of the fetus from head to breech equals one-half the length of the whole body, and since the length of the body is the most certain measurement, we have the age of the fetus, if we can measure it in utero.

In *primiparæ* one branch of the calipers or pelvimeter put inside the vagina against the head, other branch rests on the breech of the fetus. Double this to get the length of the fetus.

In *multiparæ* one branch rests on the pubis, the other the breech. (Reason is that in multiparæ the head does not enter the pelvis.) To figure out the time double the result gained, subtract 2 for the thickness of the soft parts, divide by 2 and you will get the number of months; the fraction represents the weeks. Example: 24x2 equals 48—2 equals 46 divided by 5 equals 9 1-5 months. This is a very uncertain method. But it must be controlled by numerous measurements taken when the uterus is not contracting. Take the average of many trials. If the child is transverse, take both branches of the sides of the uterus, over head and breech.

Direct measurement of the fetal head has been practiced, especially in France. The ends of the pelvimeter are placed against the head through the abdominal wall. Allowing ¾ to 1 cm. for the

thickness of the latter, and allowing 1 to 2 cm. for the oblique diameter of the head in which it must necessarily be grasped, we can arrive at an estimate of the bi-parietal diameter. The position of the head must be determined by palpation. Very accurate measurements can sometimes be taken, and the value of the procedure increases with experience. Especially useful in determining the time for inducing labor in contracted pelvis.

Carl Braun would grasp the fetus, especially the head, and by an intricate mental process would determine the size and development of the fetus, just as you judge the weight of a baby. This is also subject to fallacies, and some children develop faster than others, e. g., a child may weigh 9 lbs. at 9 months—another woman at the tenth month may have a child weighing 6 lbs. It seems to the writer, also, that the rate of growth of a given child varies from month to month, besides the normal increase in size. The parts of a child develop unequally; some children have large heads and small bodies, others small heads and large bodies. One case, the legs were out of proportion to the body, being twice the size they should be, to be in proportion (Mercy Hosp., 1903).

3. *Lightening before labor*, and the changes in the lower uterine segment and cervix. Reckon three weeks from the "settling," as it is called. Examination in the last three weeks reveals important changes in the lower uterine segment in primiparæ.

The head entering the pelvis, the cervix seems flattened out, effaced, looks forward, canal runs backward. In multiparæ and in primiparæ before lightening, the cervix is retained, in multiparæ the patency of the os shows the near approach of labor (Schroeder). Sometimes, even weeks before labor, one can pass two fingers into the cervix to the membranes. In the majority of cases you can arrive at a pretty close estimate which will get better as your experience grows. Put the responsibility on the woman, however, telling her you are relying on the dates she gives you for the computation.

MULTIPLE PREGNANCY.

The development of two ova in utero means twins. Term generally not applied to fetuses, one inside, one outside the uterus (extra and intra uterine pregnancy co-existing).

Twins occur, one in eighty-seven to eighty-nine labors. Triplets occur one in 8,000 cases, four at birth occur one in 400,000; five very rare, while six, which have been observed, are excessively rare.

Twins come from:

(1) Two distinct Graafian follicles, which may come from one ovary or one from each ovary;

(2) From two ova in one Graafian follicle;

(3) From one ovum.

The first is proven by the occurrence of two corpora lutea. The second is proven by the presence of two ova in one Graafian follicle, which has been repeatedly found in microscopic sections.

Three have been demonstrated in one Graafian follicle and Credè has had triplets with one chorion. (M. F. G. B'd 30, p. 96.)

The third is explained by the appearance of two primitive streaks and the development of two children from one ovum. If the fission of the two streaks is complete we have twins, if not complete a double monster results. Another theory is that there is one primary streak, but that it divides later.

Causes of Twins.

Acting cause unknown. Predisposing causes may be mentioned.

(1) Heredity. Seems to be transmitted in the female line, but cases where male has had twins by different women are on record. (See Parvin.)

(2) Multiparity. Twins more frequent with multiparæ; perhaps because multiparæ more frequent.

The structure of the fetal membranes in twins varies with their origin from one or two ova. *If from one ovum* we will have one chorion enclosing two fetuses each surrounded with amnion. Thus in the septum between the fetuses we will find simply two layers of amnion. If from two ova—whether these be from one Graafian or two Graafian follicles—we will have two chorions, one for each four layers. Sometimes the decidua will persist between the two eggs and show itself in the septum, therefore, six layers in the septum, but this is rare and when it occurs the deciduæ are fused and the amount of decidual tissue is not great.

The twins from one ovum occur in 13% of cases (Ahlfeld). They usually have one placenta and their circulations anastomose in the placenta as well as on the surface. Therefore, the twins develop equally and have the greatest common characters, e. g., appearance, development, sex; always of the same sex. Even in after life the resemblance is great. This anastomosis of circulation is not invariable.

Twins from separate ova have either separate placentae, or if the ova should have happened to locate near each other in the uterus, the placentae will lie in close apposition or will run into each other and anastomosis of the vessels also occur. Still the placentae may lie apart, separated by a space more or less wide. Twins from these ova may or may not be of the same sex, and often present unequal development. One may die, the other live. One may be syphilitic, other healthy.

The ova may occupy different positions in utero:

(1) One alongside the other;

(2) One behind the other;

(3) One top of the other.

Combinations can occur (see Budin Arch de Toc., 1883, p. 140). In a few cases where the septum has consisted of two amnions these sacs have communicated. Unknown if the septum has been absorbed, necrosed, or if one had formed at all. In these cases the cords may be twisted and death of the fetuses may result. Has been rarely observed in the human female. Twins are smaller than single children, but together usually weigh more than the one.

Due to the fact that there is only a certain amount of nourishment, of vitality of the mother, of placental area, and also because the pregnancy is usually terminated before the full period is completed. Women of the more intelligent classes object to having twins on the ground that their development, especially the mental, is below that of single children.

This is true of their physical condition and the mortality of early childhood is very large. Of their mental development, opinions differ. An interesting formation occurring with single ovum twins is the *acardiacus*, a fine specimen of which is in the college museum.

The allantois, in early embryonic life, of one fetus grows on the territory of the other fetus, the heart of the latter atrophies, and the fetus wastes to a mere lump of flesh supported as a parasite by the healthy one, and nourished by an artery and a vein from its placenta. There are different forms of acardiaci, head, feet, or trunk, depending on what part of the original fetus is preserved. The one mentioned is an acardiacus acormus, or trunk.

Diagnosis.

Only once have three fetuses in utero been diagnosticated before labor and this by Pinard of Paris. He found three heads and naturally diagnosed triplets.

Your attention may be called to the possibility of twins by an unusually large abdomen for the given period of pregnancy; great aggravation of the congestion symptoms, e. g., edemas, albuminuria; a very globular uterus (hydramnion) indefinite palpatory findings, lastly, finding more parts that can belong to one fetus.

In general you must be vary careful how you diagnose twins. Many mistakes have been made. Capuron in speaking to Pajot one day said, "When I find one child in the uterus after I have delivered one, I say there are twins." In labor not so hard to diagnose.

The points in the diagnosis are:

(1) A groove felt in the fundus. Can occur with uterus arcuatus, or double horned uterus, or even in ordinary labor, and is often absent in twins.

(2) Usually large size and globular form of the uterus. Occurs in hydramnios, which may complicate twins.

(3) Absence of engagement of the presenting part. Can occur with hydramnios, and breech presentation, etc.

(4) Palpation of three large parts. In diagnosis we use the terms "large parts" and "small parts." If you feel two heads and a breech, or two breeches and one head, can diagnose twins. Do not do it on the multiplicity of the small parts or on the statement from the mother that she feels movement all over the uterus, or at different, distant places in the uterus.

5) The auscultation of two different sets of heart tones.

(a) They must not be synchronous.

(b) They must have a *free zone between.*

(c) Must be heard at the same time, therefore two men should listen.

The patient must not change her position during the examination, the tones must be counted many times on each side and averages made, the difference must exceed 10 to the minute. Great care and circumspection needed to be certain.

(6) Mensuration from head to breech; if when doubled gives a length too long for one fetus, perhaps twins.

(7) Vaginal touch may reveal two bags of waters with a groove between them (Depaul).

(8) Sometimes after one bag of waters is ruptured you may feel a fetus in a second unbroken bag of waters (De Lee).

Be very careful in your examination and you can almost always arrive at a highly probable diagnosis, but do not tell the patient, as it will cause her needless worry. Tell some relative so that they will not say you did not know it. If not quite sure say nothing. The majority of twins are diagnosed only after the first child is born.

DIAGNOSIS OF MULTIPARITY.

Sometimes necessary to tell if a first or second pregnancy, or that pregnancy has occurred. Can almost always be told if sufficient care used, but if more than five years have elapsed since the birth of the last child, if it was small or prematurely born, or removed by crushing operation or Cesarean Section, or if patient be large, it may be impossible to determine, as the only signs we have are those caused by the trauma of labor.

1. The deep rupture of the hymen and perineum. If there is a tear of the perineum and *no operations* have been done or history of injury, a positive sign.

The rupture of the hymen, however, is not so certain a sign. Superficial tears occur in coitus, deep tears, forming later the carunculæ myrtiformes, occur only during labor (Schroeder). Still a woman may have no hymen congenitally, or it may be so distensible that it does not tear during labor. Generally scars around the vulvar orifice are suspicious of a labor.

2. The deep tears and scars in the cervix. In primiparae the

cervix has a round os, and a conical portio vaginalis. In multiparae the os is a transverse slit and the cervix more cylindrical or perhaps the lips are everted, thus the cervix seems to be divided into an anterior and posterior lip. Scars may be present which in the absence of an operation are positive. Especially to be seen when the cervix softens up during pregnancy. Scars in the vagina also. An infant in arms has had eversio cervicis and prolapsus uteri.

A chronic cervicitis may in a virgin produce similar conditions.

3. The vagina in a nulliparae is rough, rugous, tight. After bearing a child, smooth, larger, softer.

4. Mammary glands deeply pigmented, flabby; colostrum. Striae gravidarum may be found.

5. Striae Gravidarum occur in fat people and tumors, and absent in six to ten per cent of pregnancy cases. Abdomen not tight, some diastasis of the recti muscles.

Still you are never in a position to assert positively. Say, "It is consistent with the facts in the case that this woman was or was not pregnant." You can usually be positive of the occurrence, but you can never deny its having occurred, especially now when so many operations on the genitals are being performed. Women wanting to hide the condition will say an injury or an operation was the cause of the scars.

DIAGNOSIS OF THE LIFE OR DEATH OF THE FETUS.

Consider the fetus alive in the absence of positive evidence to the contrary. One can seldom assert with positiveness that a given fetus is dead; can assert it is alive. If the fetal movements are heard or felt by the doctor or if the fetal heart tones audible, or the funic souffle, fetus is alive. In a healthy woman usually safe to assume fetus is alive.

Signs of the Death of the Fetus.

1. Cessation of the movements after having been felt by the woman and doctor. Must persist in many examinations. Presumption only.

2. Absence of heart tones after being heard (careful and frequent auscultation). Presumptive value only.

3. Palpation of the abdomen. Uterus and fetus do not have the elasticity characteristic of a living ovum.

4. Through vagina can feel that the head is softened. The bones movable on each other, within the scalp. Determinable within nine days, sometimes earlier. *Certain sign*, but often hard to elicit.

5. The temperature of the vagina sinks a little. It is usually .5 degree C. higher when the fetus is alive. (Little value.)

6. Discharge of altered liquor amnii, e. g., bloody or milky. Fetid liq. amnii not incompatible with a living child.

7. Languor, malaise, sinking of the breasts, loss of weight can come from too many other causes to be of use. Loss of weight is the most reliable, since a woman should gain weight the last four months.

8. Cessation of growth of uterus. Valuable sign if carefully watched. Uterus instead of growing gets smaller, harder, more evenly resistant all over. The intermittent uterine contractions are more frequent, more marked, and there may be an occasional discharge of blood, or bloody mucus. Even this sign subject to fallacies. (a) The mentioned findings may be absent when the fetus is dead, or present when it is alive. (b) The uterus may enlarge after death of the fetus, due to degeneration of the ovum, e. g., hydatidiform mole.

9. Woman gives a history of losing several children at a certain month in pregnancy and now has identical symptoms.

10. Findings in the urine, e. g., acetone, peptone, not reliable.

The languor, malaise, light chills, bad taste in mouth, may be explained by the absorption of toxins, similar to those of degenerating tumors, e. g., fibroids. When a cause exists for anticipating fetal death, the diagnosis is rendered easier. Such conditions are syphilis, eclampsia, nephritis, high fever, cholera, etc.

Can seldom make positive diagnosis. Anyway no need to do anything, since if the fetus is dead, delivery will soon occur. Not necessary to induce labor. No harm results from the condition except in the rarest instances, and if patient is properly watched the time for interference can be safely determined.

HYGIENE OF PREGNANCY.

Women call the doctor and engage him for their confinement earlier now than formerly, earlier among the better classes than the poorer, earlier in the city than the country, earlier in the United States than in England. There is a great advantage in this; in that it may enable the doctor to learn the traits or constitution of his patient, watch for any symptoms of disease and prepare her properly for the labor; therefore encourage this in your practice.

You will have many and varied questions to answer and it is well if you are acquainted with the subject. See Surbled. La Vie a Deux., p. 127.

General Rules.

1. Patient should not change good habits; it is well if she should have no bad ones to change. She should pursue her usual course of life.

2. *Dress.* There should be no circular constriction at any part of the body. Corsets should not be worn after pregnancy is diagnosed. The Latin term for the condition of pregnancy was "incincta," without a girdle, and had reference to the laying off of the girdle when pregnant. This term is preserved in the French as "enceinte." You will have difficulty in enforcing this rule. A good substitute is the Ferris maternity waist, which must be worn loosely. No steels in the corset, if worn. All dresses should hang from the shoulders, using suspenders, if necessary, or buttoned onto the waist.

Flannel should be worn next to the skin, both in summer and winter, heavier, of course, for the latter. Union suits are good. Better wear fewer skirts and heavier drawers, than heavy skirts. These cause pain in the back, headache, etc.

Low-heeled shoes and have the big toe in a straight line with the inside of the foot if possible, so-called orthopedic shoes. Women warmly shod.

3. *Diet.* In general the diet should be the same, excepting highly spiced puddings, fatty, fried starches, etc. She should eat heartily, but not gluttonously, thinking she is eating for two. Three meals a day sufficient. If the vomiting deprives her of her breakfast, let her wait a few hours and then try again; by no means let her go to the pantry and eat cold pie, etc. Water should be drunk freely, at least five full glasses a day; sterilized or filtered. Alcohol

better left alone. Wines bad, better be left alone, unless some indication for them. Eat cereals, especially oatmeal, because it contains a large percent of calcium salts; cracked or rolled wheat. Bread made from whole wheat flour. These tend to correct constipation. Still must be given with care if the patient be used to lighter articles of diet, as they cause indigestion and sometimes constipation. Eat fruit in large amounts, especially those that have fruit acids, such as apples, and such as contain sugar, e. g., grapes, pears; stewed or better raw.

Vegetables, but not those that have too much cellulose, e. g., cabbage. It is believed that these, by accumulating in the bowels, cause reflex irritation and perhaps eclampsia. Meats may be taken once a day. If there is any kidney trouble meats are to be avoided. Same to be said of broths. In fat people limit the whole diet, especially fats and water, but the amount of urine must not be allowed to get below 32 oz. Strong tea and coffee to be avoided at all times. Milk and eggs to be used freely. If kidney troubles, buttermilk.

Breakfast should be light, without meat. Dinner at noon, with one meat, plenty fruit, raw or cooked, and vegetables. Supper light. Fluids sparing at meals, freely between them.

For the constipation of pregnancy, regulate the diet in the way indicated; prescribe sufficient exercise, a glass of cool water before breakfast; habit all to be used. Figs, dates, etc.

Withhold drugs as much as possible. Of drugs cascara is the best. Active cathartics with caution. Co. Lic. Powd. Dr. ss before bed. In hemorrhoids may use aloes. If causes pain, stop. Enemata of oz. ii warmed olive oil, or oz. viii warm salt water; don't use too much; dilates the bowel. A good combination for atonic constipation is Ext. Casc. Sag. m. x, Tr. Rhei, Arom. m. x. Tr. Nuc, Vom. m. v.

4. *Exercise.* Violent exercise, of course, to be avoided. It is not possible to build up a weak muscular system during pregnancy. That should have been done before. To be *avoided* are jolts, running, sudden lifting, great weights, going up and down stairs quickly, horseback riding, cycling. (See Middlemarch, by George Eliot.) Riding over rocky roads, etc.

To be *encouraged* are walks up to one-half mile in the sunlight, not at night. In winter careful not to slip. Housework, but no washing and not too heavy bed making. Easy carriage drives.

Railway travel, automobile, and voyages better be avoided at all times.

If a short journey, allowable. Pinard says that frequent travels on the railway in the early months of pregnancy conduce to the formation of placenta previa. Advise against them. Patients almost always go anyway, therefore if something happens the blame will be where it belongs.

Coitus During Pregnancy.

Has been said that a woman has a dislike for coitus during pregnancy. True in some cases, in others an increased desire, may be nymphomania. Subject one of importance, as is evidenced by the many publications on the subject. There are many reasons why coitus should not be performed during pregnancy.

1. The danger of abortion, impact of the penis against the cervix, or the great congestion of the act may cause abortion. No doubt that the frequency of abortion in young married people is due to this cause. They think that since pregnancy exists, no danger, and therefore are excessive.

2. Nervous shock not borne well by a woman already taxed with demands on her nervous energy. It often increases the nausea and vomiting. In some cases the sight of the husband will bring on an attack of vomiting. Removal from home may cure it.

3. Animals do not copulate when the female is pregnant. Some one said, "We do not take pattern after animals in other matters." Still in some cases we might do well in allowing the instinct of animals to guide us.

4. Danger of infection. Specially in multiparae with patulous cervix.

Copulation during the first four months is more dangerous than later. During the last month the uterus has attained a high state of excitability, therefore copulation ought not to be allowed. Some women will admit the male up to the time of labor; in such a case puerperal fever might close the scene. Some doctors use the rule that between the fourth and eighth months copulation at the desire of the female only. Other reasons than have been given are that it takes the strength away from the fetus, that it makes the fetus sensual (maternal impressions), that it causes the wife to lose her respect for her husband, etc.; all have more or less truth in them. It would certainly be better for every one that coitus be not practiced. Advise against it so that if something happens the blame will be where it belongs.

Bathing.

Cold baths and hot baths in general should be avoided. A cold plunge in all cases avoided, but if the patient is used to cold water, no objection to cold sponge bath.

No hot baths or hot sitz baths allowed. Danger of exciting contractions of the uterus by either, especially the hot.

Tepid bath may and should be taken freely, at least four times a week, preferably daily. Object is to keep the "pores open," to stimulate the skin, to excrete effete matters and thus relieve the kidneys (a point that cannot be overestimated) and for cleanliness, since pregnant woman secretes more. Salt bathing at home has

some use, but sea bathing and swimming must be prohibited, as a powerful cause of abortion. Turkish and Russian baths prohibited during pregnancy. Some women do not react after bathing, but are weakened. Here the bath must be restricted.

Vaginal douches may be given during pregnancy. Rule, always tepid, at low pressure, and a fountain syringe; exclude air. Sterile water, or if discharge suspicion, 1/2000 Permanganate of Potash or 1% lysol. Not to be used unless really necessary.

Mental Occupation.

Woman is impressed with the duties of a mother and wants to know what to do and what not to do. She should busy herself (for nothing is so bad as idleness) in reading, painting, etc., as usual. Recommend good books. If she believes that if she reads good books, etc., her child will be bright and intellectual, humor her. Some authors claim that if woman visit galleries of art, etc., with one child, and reads astronomy with the second, she will get an artist and an astronomer.

A good guide for the woman to use is that of Pye Henry Chevasse. It is written in an engaging style and contains many sensible points. It is thoroughly English, however. Few women really need books about labor, but they will sometimes persist and get a bad one, like Tocology, so advise the above to prevent it.

A primipara is likely to be despondent and anxious to be over her trial. Assure her that with good care before and during labor all cases are normal, which you can consistently do with 96% of cases of normal pregnancy and labor.

Church and theater going, to be restricted, because the CO_2 and generally bad air may injure the fetus, or in the crowds which sometimes take place, she may be jammed, and further, it is not in good taste. Pregnancy is by all means honorable, but she should not intrude it on the public.

A few words about *Maternal Impressions:*

Reference has already been made to the effect of impression on the mother's mind causing physical deformities of the fetus. The mother as well as the father may impart certain traits physical, as well as mental, to the offspring. It has been denied that any impression made on the mother during pregnancy can cause a change in the mental conditions, or the shape of the child:

1. Because no nerves ever were demonstrated in the umbilical cord. Virchow himself could find none.

2. The child is completely formed by the end of the sixth week and pregnancy is seldom recognized at this time.

3. All monstrosities in the human have been observed in the lower animals, and no one will admit that a pig with one eye and nose above it was the result of an impression made on the sow's

mind. (This monstrosity is called cyclops, fine examples in man and beast in the college museum.)

Arguments without number, and many cases, have been adduced on each side. The weight of opinion is against a direct impression of the fetus, e. g., where a woman sees a man minus a leg and gets a child minus a leg; but the health of the mother *can* and does influence the growth of the child. At present we can neither affirm nor deny the influence of maternal impressions.

Care of the Breasts.

It is important that the breast be put into the best possible condition for nursing. Tendency for American women not to nurse their children was on the increase. A telling and very successful crusade against this is being carried on. It is a great misfortune, both for mother and child, if the mother does not nurse her infant; for her, in that she is likely to have sub-involution of the uterus, and for the baby in that it is poorly nourished, may die in its earlier months and may not be strong all through life. Further, the question of expediency. A wet nurse is often the beginning of domestic war and unhappiness, the Arnold sterilizer's advent to the nursery is the forerunner of colics in the baby and even grave nutritional disease. Much more trouble to bring up a baby on the bottle than at the breast.

Some women have inverted nipples, or fissured nipples, or bifurcated nipples, or the nipples may be sunken or constricted at the base, or flat; a tendency to crack may even be manifested during pregnancy. In the last two months of pregnancy if the nipple be not well formed, let the *patient herself* draw out the nipples morning and evening with her fingers gently. Brisk manipulation may cause uterine contraction. Wash the nipple with Tr. Sapo. Vir. and water once a week, on other days simply water. Anoint every day with cocoa-butter or albolene. Some authors advise hardening the nipple with alcohol, alum, and tannic acid, but it is not to be recommended. No compression of the gland by the dress, especially care to avoid compression of the nipple. May make a ring of cotton or wear a wood nipple shield under the chemise. The simpler remedies are the better. If heavy and painful, the breasts should be supported by some form of bust supporter sold in the stores. For details see Obstetrics for Nurses.

Examination of the Urine.

Every three weeks to the seventh month, the urine should be examined. After this as often as once in two weeks, and if there are albumin and casts, every day. Seldom can carry this plan out. At least every two weeks in the last two months of pregnancy. Kidneys, the most vulnerable point in the body during pregnancy,

and it is therefore essential that you know in what condition they are. The examination should be for albumin, using heat, nitric acid and the picric acid test, for the specific gravity, sugar, per cent. of urea and above all, casts. Amount in twenty-four hours also valuable. Albumin occurs in a large per cent of cases, but renal albumin in not over 5%, and this is the most significant. The onset of a nephritis may be foretold and its progress checked if you examine the urine carefully, and frequently

Measurement of the Pelvis.

In this country deformed pelves are very rare in the native born women. Of course, the foreigners have the same classes of deformed pelves here as at home. Still later statistics show that milder grades of pelvic contraction do exist, but not so frequently as in Germany, Austria and France. Reasons lie in the better hygienic surroundings, better food and more of it. We do not meet so many abject cases of poverty as in Europe.

We cannot go into the causes of pelvic deformities here, but I wish to emphasize the necessity of making examinations to determine the presence of a small pelvis. You may meet with some difficulty in making the examination, since the minority of even good physicians make them. If the patient come to you after lightening has occurred, less necessity to examine her pelvis, since the pelvis is large enough for that particular head, but the outlet may be contracted.

Patient lies lengthwise in bed, covered with a sheet, with underclothing drawn up on the breast. Can take measurements through the sheet, but better to push this down to the hips, always covering the pubic hair. Examine the general conditions of the patient. Length, bones, ends of ribs, curvature of the spine, of the legs, shape and size of the head. A tall patient seldom has a contracted pelvis. A short woman will be likely to have a pelvis small in all its diameters, that is, a generally contracted pelvis. A woman that has crooked legs, bow legs, e. g., may have a contracted pelvis. This is due usually to rickets, and the enlargement of the ends of the ribs, or other epiphyses, points also to rachitis, so also does a a large, square head. A patient with curvature of the spine can have a distorted pelvis. We will return to these points in the discussion of contracted pelves.

There are six measurements which are quite essential:

1. The distance between the spines of the ilia. Outer lip.
2. Between the crests of the ilia. Outer lip.
3. Diameter of Baudelocque; external conjugate.
4. Bitrochanteric diameter.
5. Circumference of the pelvis.
6. Diagonal conjugate. C. D.

Spines, 26 cm.; Crests, 29; Trochanters, 30; Baudelocque, 20; Circumference, 90; Diagonal Conjugate, 12½.

Baudelocque—from under the tip of spine of the last lumbar vertebra to the upper anterior part of the pubis. The deductions to be made from these findings will be discussed under mechanism of labor.

Posterior branch of the pelvimeter to be placed in the depression made by this process. The Rhomboid of Michaelis, a beautiful diamond shaped depression on the posterior aspect of the pelvis formed by the dimples of the posterior inferior spines of the ossa innominata, the point where the glutei come together, and the groove of the spine. Seen on beautiful statues, e. g., the Capitoline Venus. Modern sculptors emphasize the hollow. The depression for the calipers is usually at the apex of the rhomboid, but may be a little under it.

The use of this landmark in the diseases of the pelvic bones will be discussed under the pathology of labor.

The circumference is taken so that the tape lies between the crests and the trochanters on each side and in a plane perpendicular to long axis of body.

The diagonal conjugate is the distance from the under edge of the pubis to the promontory of the sacrum. It must be taken by the two fingers passed into the vagina, so as to touch the promontory, and then pressed up against the lig. arcuatum.

The Importance of Pelvic Measurements.

Taken early in pregnancy we can induce labor for a contracted pelvis. Second, we can know what kind of deformity we have to deal with and can prepare for the same. Often called in consultation to a case where some bad position of the fetus, which could have been prevented had the doctor recognized that he had a deformed pelvis to deal with, and thus baby's or mother's life saved. Again, during labor certain anomalies can only be explained after a careful examination of the pelvis.

Engagement of the Nurse.

This is an important duty. After you have made your diagnosis as to the time of labor, you engage the nurse for the labor. Better do this yourself unless patient has some preference in the matter. If you know that the nurse recommended is a good one, engage her, if not, exert your authority in the matter.

Qualifications of a nurse: She should be strong, neat, sympathetic, a graduate of a training school where she got obstetric training, and she should have had some experience in private practice. She should be agreeable to the patient, above all loyal to you. She should be willing to carry out instructions to the letter, and be

familiar with your methods. She should carry out all instructions and not be a tale bearer. Poor nurses often quarrel with the servants, and may cause discord in the house. A nurse should be a woman of tact.

Diagnosis of Position and Presentation.

The position of the fetus during pregnancy varies a great deal. From its mode of growth it has a flexed position. In the middle of pregnancy there is no constancy in the fetus' position at all, but toward the end it tends to become more fixed. After the head has entered the pelvis there is usually no more change in position, but I have found that the head sometimes leaves the pelvis and re-enters in a different position. In multiparae, however, the position changes frequently in the last weeks. Rules for determining position of child are the same as during labor.

Four (4) principal movements:

1. What is the ovoid—longitudinal or transverse?
2. What is over the pelvis—head or breech?
3. What is in the fundus—breech and feet or head?
4. Toward which side is the back, right or left?

Diagnosis may be controlled by the position of the heart tones.

Not necessary to make internal examination.

If you find the head over the inlet in the last few weeks, you may make a gentle attempt to press the head into the inlet. This is called Müller's procedure, and its object is to see if the head will fit the pelvis. Examine your patient in the last week before labor and determine if the child lies aright. These points will be enlarged during consideration of the conduct of labor.

List of Articles Needed for Labor.

This will depend on the purse of the patient. Following is a list the writer gives his patients:

Two hand basins of granite ware.

Two hand brushes, wood backs.

One new two-quart douche bag.

Rubber sheeting enough to cover the bed and a piece a yard square.

Two pounds J. & J.'s absorbent cotton.

Five yards J. & J.'s borated gauze.

One hundred bichloride of mercury tablets—P. D. & Co.'s.

Four ounces lysol.

Four ounces of boric acid crystals.

One ounce of camphorated oil.

The gauze is used for making the pads for the labor and the napkins to be used to catch the lochia.

As a general rule among the poorer classes you will have to

bring most of the antiseptics, gauze, cotton, etc., yourself, or prescribe them after you get to the house. Do not use the "Aseptic" gauze that is put on the market. Always antiseptic gauze.

1. Give the patient a few instructions about the advent of labor, what to expect and what to watch for. What she should do before you come, in case she has no nurse.

2. You ought to speak to the nurse if she be a stranger to your methods, telling her what you want her to do and what not to do.

3. It is well to visit the patient in the last 10 days before labor to see if child lies in proper position, to make the arrangements about the confinement room, bed, etc.

4. In general you treat an obstetric case with the same care that you would give a major surgical case.

PHYSIOLOGY OF LABOR.

Definition and Clinical Course.

Labor is that function of the female organism by which the product of conception is extruded from the uterus through the vagina into the outside world, the regressive metamorphosis of the genitals started and the secretion of milk inaugurated.

Thus there are three essential points in the definition. This definition excludes the extraction of the fetus by any other passage, as in Caesarian Section.

Abortion is the interruption of pregnancy before the fetus is viable.

Premature Labor is the interruption of pregnancy after the fetus is viable, but before term.

Miscarriage is a term used by the laity to signify the occurrence of a premature interruption of the pregnancy at any time.

Labor is a normal function of the female. It is so intricate, however, that a great many irregularities may mark the course. The altered hygienic surroundings, the tendency to laziness, the evils of dress, of living, occupation, heredity, evolution of the head. i. e., increased size of the cranium due to the increased mental capacities of the race, chronic endometritis, salpingitis, etc., all tend to produce conditions which influence the course of labor and may make it absolutely impossible in a given case, or make it fraught with great or even fatal danger.

We thus must divide cases into two groups:

1. Normal labor or Eutocia.
2. Abnormal (pathological) labor or Dystocia.

As a matter of fact, a really normal labor without the slightest irregularity is rare; almost always there is some small point that is peculiar, although it may not affect the general course of the labor and the case may end *favorably* for mother and child. In general we call those cases normal where we do not have to interfere, where the patient expels the child and placenta herself, and she and the child live. The specific boundaries of Eutocia and Dystocia we will come to in the course of the lectures.

The expulsion of the ovum is brought about by uterine contractions, but there are other factors involved. In considering the mechanism of labor, we have to consider three factors:

Powers; i. e., uterus, abdominal muscles, vagina, etc.

Passages; i. e., pelvis, soft parts.

Passengers; i. e., the fetus and secundines.

When the relations of the three to each other are normal; we speak of Eutocia—when otherwise, Dystocia.

When we consider the conduct of labor, we have to add a fourth factor, Complications.

Causes of Labor.

What brings on labor? Why should a uterus which has carried an ovum for so long, suddenly, violently expel it? Nature certainly recognizes the right time for the expulsion, i. e.,

1. The fetus must not be too large, and
2. It must be so far developed as to be able to continue its extra uterine existence.

How this point is determined, we do not know. There are numerous theories as to the exciting causes of labor. A few of the most important may be of interest, but they have a further interest in that we may want to induce labor ourselves, and a good general plan is to imitate nature; it is surprising how much one can learn from nature, and how, by following the path nature takes, cases can be brought to a happy termination.

I. *Maternal Causes:*—

(a) (1) Pressure of the presenting part on the lower uterine segment, on the great cervical ganglion or its branches. This is an old theory and is supported by many facts; e. g., that labor takes place when the head is in the pelvis for any time. (2) In contracted pelvis, where the pressure is earlier, labor occurs earlier. (3) Argument from analogy, material in the rectum or bladder.

This theory does not explain the labor in transverse presentation or in breech presentation where no part engages.

(b) *Excessive distension* of the uterine wall. This holds good only in pathologic cases; hydramnion, multiple pregnancy.

(c) *Thrombosis of the placental vessels* in the latter weeks of pregnancy. Leopold says this causes increase of CO_2 in the blood of the uterus, and therefore contractions. Must explain the thrombosis, and again this is not constant.

(d) *Fatty degeneration* of the deciduae which makes the fetus a foreign body. Not constant.

(e) *Menstrual influence.* Said that every month a reflex goes from ovary to uterus, causing menses in non-pregnant and the congestion during pregnacy. May cause small hemorrhage which brings on labor. This theory presupposes too much:

1. That there is some constant relation of ovulation to menstruation.
2. That ovulation is a monthly occurrence.
3. That it takes place during pregnancy.
4. That the tenth month is particularly disposed.

All untenable. Theory not good. Relation of 280 to 28 is accident. Labor can occur without the ovaries. In some women, particularly of a nervous type, there occur during pregnancy, at the time of the usual menses, peculiar sensations and manifestations which show that some influences are at work.

Neuralgiac pains, especially in the sacro-sciatic, lumbar region, insomnia, skin eruptions, increase in varicosities, vomiting, nausea, constipation, decreased urine, sometimes albumin, uterine pain, sometimes small hemorrhages and tendency to abort are greater at these periods. The influence of the corpus luteum is suggested.

(f) *The Increase in the Irritability* of the uterus. We know that the uterus contracts from the beginning of pregnancy and also that the contractions become stronger and more easily elicited toward the end of pregnancy. This increased irritability is due to the great increase in the development of the muscular fibres and the nerves of the cervical ganglion. When the end of pregnancy is near some slight accident may make the contractions stronger and each contraction stimulates the succeeding one till regularity is established.

II. *Fetal Causes.*

The old notion that the fetus delivered itself was held even by Hippocrates, who said the fetus got hungry and came out. Numerous other reasons are given why the fetus wished to be released from its prison. Hasse says the changes which the circulation undergoes in the latter weeks, *i. e.*, narrowing of the ductus arteriosus and venosus, cause an increased venosity of the fetal blood. This blood causes labor by irritating the uterine wall.

Brown Sequard has demonstrated that an increase of the amount of CO_2 in the maternal blood will cause uterine contraction, especially if the blood of the uterine sinuses is venous.

Another author claims that it is lack of oxygen. At any rate, it seems that blood not in proper condition may bring on labor, and this may explain some cases. The theory that the fetus urinates into the liquor amnii in the latter months, that the urea is decomposed into ammonia in the uterine muscle, which causes contractions, has merely historical interest.

These are the principal theories, of which the most plausible are pressure of the presenting part on the lower uterine segment, the increased irritability of the uterus and changes in the fetal circulation. The importance of accident, however, must not be overlooked.

When everything is ready for labor, the parts softened, the cervix begun to unfold, the uterine muscle well developed and having attained a high degree of irritability, it is easy to see how some slight cause, mechanical or emotional, may suddenly increase the uterine contractions.

As soon as one contraction has occurred, it forms the irritant for another, and thus labor is put in progress. Such causes are:

jolt, running up and down stairs, washing, or lifting a weight, a little diarrhea, or a coitus, or sudden fright or joy.

Thus it is impossible to determine the duration of pregnancy, since its end may be caused by accident. Still, the fact that labor occurs very regularly, about 280 days after the last period, makes us believe that there must be some law governing the function. What it is, no one knows.

Can a child be born before the end of the ten lunar months and be well developed? Cases have occurred which tend to prove this. A woman has given birth to several children at seven months, all of which were well developed (quoted by Parvin).

Again, can pregnancy be prolonged over 280 days? Pregnancy cannot go on indefinitely, nor can pregnancy be continued much longer than 280 days. A dead fetus retained in the uterus is not pregnancy. Pregnancy varies in length in different women and in the same woman at different times. We have already seen how it is possible for a woman to reckon eleven lunar months, *i. e.*, when the ovum was from the *first menstruation missed*, and not from the *last present*.

Cases are not rare where a woman goes several weeks beyond her time. This happens mostly in primiparae, but also in multiparae; usually the child is a male and quite large—one might say, over-developed. They have considerable clinical interest.

A certain number of cases are on record where at the natural culmination of pregnancy, pains come on, but labor did not terminate—the fetus died and was expelled or extracted weeks, months or even years later. This was called "Missed Labor," by Oldham. Few published cases will stand a sharp investigation, but there are real cases. Causes are usually, peritonitis chronica; fibroid tumors of the uterus; obstructions on the part of the fetus or cervix.

When a woman has a threatened abortion, but the uterine contractions cease, the ovum dies, and is not expelled for months, we speak of "missed abortion." Expulsion usually occurs at the end of the ninth month or earlier.

CLINICAL COURSE OF LABOR.

It will be simpler to understand the complicated problems of labor if first we get a good idea of the clinical course of labor, that is, what you would see when attending a case of labor.

In most primiparae and in many multiparae, there is a *prodromal stage* of labor. It is not so well marked in the latter, however, and labor seems, therefore, to come on suddenly with them.

These prodromata are:

1. In the last three weeks, *Lightening before labor*, with its symptoms; this is often accompanied by a glairy mucous discharge. May be absent, especially in multiparae, or unnoticed.

2. False Pains: In the last weeks the patient is often annoyed by uterine contractions that are painful. They occur especially at night and lead to the suspicion of beginning labor.

3. About twenty-four, or forty-eight hours before labor, there is a discharge of mucus, often mixed with blood. It is the plug, which formerly filled the cervix. The blood comes from the surface left bare by the separation of the decidua. It is more or less profuse and is important; is called the "Show."

4. An examination in the last three weeks of pregnancy shows the *cervix soft,* shortened, perhaps completely effaced; in primiparae the external os opened for one or perhaps two fingers. In multiparae the cervix will admit two fingers to the membranes.

The head is almost always well in the pelvis, in the last two days, but is still movable.

The uterus can be felt to contract under the hand, but the contractions do not produce much change in the shape of the uterus. They are still normally insensible. They are evoked easily, which is a sign of approaching confinement.

Labor, itself, begins (1) when these contractions become sensible to the patient, *i. e.*, painful, and (2), when they are effective in dilating the cervix and os; (3) when they become regular. In some cases in the last few weeks of pregnancy there are pains in the lower abdomen which come from constipation. They are called false pains. Then, again, the uterus may contract and the contraction be attended by pain, yet there is no effect on the cervix. These are called false pains also, or "dolores presagientes." These pains may occur throughout the last two months and become very annoying.

The uterus has a different shape during contraction, *i. e.*, it becomes longer, narrower and more prominent in front. The uterus during pregnancy does not assume this shape during contraction, and thus one can differentiate even before much dilatation of the cervix (vaginal portion). During pregnancy, the uterus simply hardens while contracting.

Labor itself is divided into three stages:

1. From the beginning of the pains till the os is completely dilated and flush with the vagina, thus forming one continuous canal, called the "parturient canal." This is the stage or *period of dilatation.* (Eröffnungsperiode.) The bag of waters usually ruptures at the end of this stage—perhaps during it. First stage does not include the rupture of the bag of waters, the time of whose rupture is very variable.

2. Second stage, from the end of the first stage till the expulsion of the fetus is completed. It is the *stage of expulsion.* (Austreibungsperiode.)

3. Third stage, extends from the delivery of the child till after

the expulsion of the placenta, etc., and contraction and retraction are established. It is the *period of the afterbirth.* (Nachgeburtsperiode.)

In the first stage, recurring regularly about fifteen minutes apart, we notice the uterine contractions. These are appreciated by the patient as pain and are, therefore, designated by the various races from time immemorial as "pains," "dolores," "douleurs," "Wehen." No normal labor is painless. Writers of all ages have described labor as painful. The Bible mentions it in numerous places. Accounts of the uncivilized races disprove the claim made by some that with them child-bearing is painless. (See Ploss, Das Weib.)

Still, the severity of the pain varies. Some races, especially the uncivilized, have generally easy labors, whereas the highly cultured woman has hard, painful labors. This is true to a certain extent in our civilized country, the difference between the poor and the rich. The pain varies in different women, and the ability to stand pain varies in women.

As the labor progresses, the pains gradually grow stronger. Whereas, at first, patient just bends over a little and has a change of countenance, after a few hours she may utter a cry. The cry is simply one of pain, similar to that of a severe toothache, or intestinal colic. Some women bear the pains better than others, grunting merely, while some raise a hue and cry which wakes the whole household. During the pain one observes the uterus contract. This begins before the pain is felt and ends after the painfulness is over. The uterus rises high in the abdomen, increases in diameter anteriorly and posteriorly and decreases laterally, assumes a pear shape, at the same time it becomes tender, tense, the ligaments stand out sharply. There is a stage of accrement, acme and decrement in each pain.

Under the influence of the uterine contractions:

1. A larger amount of the serum is forced into the lower uterine segment. Physiological edema. Softening of l. u. s.

2. The fibres of the lower uterine segment are drawn up into the body of the organ.

3. The liquor amnii is forced downward against the internal os.

4. The membranes are bulged out through this.

5. The retraction of the fibres of the lower uterine segment, and the membranes being forced out of the cervix like a bladder, cause a dilatation of the cervix from above downward, and finally a dilatation of the external os. This dilatation of the cervix by the bag of waters is a very gentle and efficient one. The whole force of the uterus is not used, since the head resting against the lower uterine segment divides the cavity into two parts.

The resistance at A A diminishes the power of a′ a″, therefore the tension in G is not so great as in B. Should the body not press fast to A A′, allowing the fluid in B to communicate with the fluid in G, the tension in G equals that of the space of B. This occurs often clinically. During a pain the tension in B rises, therefore, also of G, but to a less degree; when the pain passes away, the tension in both subsides. Thus it is seen how the head acts as a ball valve, and makes the gentlest possible method to efface and dilate the cervix. Compare this to the rough dilatation which would occur were there no bag of waters, and the head were forced through the cervix by uterine and abdominal forces. This happens when the bag of water ruptures before labor, e. g., in primiparae. These are called "Dry Labors" and are usually long, tedious and painful. Operative interference is oftener necessary in dry labors.

We have used two terms which need explanation—effacement of the cervix and dilatation of the os cervix. At the beginning of labor, the cervix is shaped thus,

It is drawn up into the body of the uterus and dilated from above downward until the external os remains like this.

This is *effacement* of *the cervix.*

After this is complete or nearly so the external os dilates (by the bag of waters, or the presenting fetal part projecting through it), until it is large enough to allow the child to pass. This is *dilatation of the os.* When these processes are completed the parts look like this:

The edge of the cervix is drawn high up and cannot usually be reached by the finger, the external os is flush with the vagina.

The bag of waters projects through like a big watch crystal. The first stage is now complete and the bag of waters usually ruptures, but may not, or may have already ruptured. If the child is born with the bag of waters unruptured, its head is covered by the membranes, which are called a "caul." The rupture of the *bag of waters usually takes place* at the height of a pain and is usually central, when the waters come out with a gush. Or the rupture may take place high up and the waters dribble away at each pain. Sometimes an accumulation of fluid between the two membranes occurs and the chorion ruptures while the amnion remains intact. Thus we seem to have two bags of waters.

At first the pains are an hour or 30 minutes apart. Generally irregular both as to time and severity. When the labor is well started they are 5 to 10 minutes apart, later 3 minutes; seldom more frequent than this. In the first stage, the pains are described as grinding, or like a severe, general, intestinal colic. They often seem to come in pairs, a mild one followed by a severe one. They last 30 to 90 seconds, or longer. This varies in different women, different labors, and different times of one labor. May subside and recommence after hours or days (rare). Patient is cheerful between pains, or may doze.

After the rupture of the bag of waters there is generally a short pause in the pains. The uterus needs time to accommodate itself to the diminished size of its cavity, for the reimposition of its muscular lamellae. There may be a few drops of blood.

Coincidently with these changes in the cervix the fetal body has descended lower into the pelvis, the bag of waters, or the head contained in the lower uterine segment distends the vagina and may

reach the perineum. It presses on the nerves in the rectum and outlet of the pelvis and patient feels like bearing down as if at stool.

The Second Stage Begins.

Now the pains become stronger and more frequent, every three to two minutes, and the patient utters a peculiar cry. It resembles that of a patient having a hard bowel movement; she holds her breath and presses down, usually taking some object to pull on and pressing her feet against the foot of the bed.

Owing to the pressure of the head on the sacral and obturator nerves as they go out of the pelvis, the patient complains of radiating pains in the legs and to the back.

In general, the patient is more hopeful, since she can help and feels that there is some progress in the labor; whereas, in the first stage, all she had to do was to bear the pain.

During the contraction the uterus gets very hard, the patient uses the abdominal muscles, gets turgid in the face, beads of sweat appear on the brow, she is in a high state of nervous and muscular excitement.

The head comes down and bulges out the perineum. The bulging begins from behind. Patient may have defecation now. The anus is soon everted and one can see its anterior wall. After each pain the perineal tumor recedes, but during each pain it increases. Soon the wrinkled scalp can be seen between the labia during a pain. After a few more pains a larger segment of the head becomes visible. Under great muscular exertion the head is finally expelled. The occiput comes first, from under the pubis, and finally the forehead, face and chin come over the perineum. After this there is a pause, of a few minutes, when the pains are renewed, the shoulders are delivered, and then generally the trunk, in one long, hard, expulsive pain. The child gasps, lying between the thighs of the mother, and soon cries vigorously.

A little blood and the rest of the liquor amnii and the ends of the membranes are now discharged. The uterus contracts down into a ball. The patient feels much relieved. She may have a chill now, but this is physiological, since there is no rise of temperature. It is the attempt of nature to re-establish the circulation after the loss of fetal circulation; may occur after placenta is expelled. Is not constant.

The Second period is now ended; the third begins.

After from five to twenty minutes, devoted to rearrangement of the muscular lamellae, the uterus begins to contract again. Some blood usually appears externally, with the first pain. The uterus lying as a somewhat relaxed, slightly flattened body, the size of a cocoanut, during a pain becomes smaller, harder and globular. Soon

it rises high in the abdomen, usually off to one side (mostly the right), while below, over the pubis, the abdomen feels soft and boggy. At the same time *the cord advances* a few inches from the vulva. These signs indicate that the placenta has loosened from the uterine wall, and has descended into the lower uterine segment and upper part of the vagina. At intervals of four to five minutes the uterus contracts—afterpains. When the placenta is in the uterus the organ is large and globular. When the placenta has been forced from its bed into the lower uterine segment and upper vagina, it assumes a flattened pear shape. The flattening is from before backward and the fundus is sharp. On the anterior or posterior surface there is often a broad, shallow dimple to be felt (the site of the placenta). After a few uterine contractions, or if blood accumulates in the uterus, the shape again becomes more globular. The triangular shape of the uterus is another evidence that the placenta has left its cavity.

After a period (if the patient is left alone), varying from fifteen minutes to three hours or longer, the placenta is spontaneously expelled by the combined efforts of the abdominal muscles and the uterus. Generally, the doctor does not wait for this termination, but completes the process himself. The placenta is usually inverted like an umbrella, and draws the membranes after it, peeling them off the uterine wall (Schultze's method). Sometimes the placenta slides out without doubling up. The lower segment appears first (Duncan's method). With the afterbirth a less or greater quantity of blood is discharged. Now the uterus contracts down into a hard lump in the inlet of the pelvis, extending to the navel. It is of the size of a fetal head.

The third stage has ended. The *Puerperium* begins.

The uterine contraction, the most prominent symptom in labor, deserves more consideration.

The characters of uterine contractions are:

1. *They are involuntary.* Woman has no control over them, but some mental emotion may cause a temporary cessation, e. g., abrupt entrance of a stranger.

2. *They are said to be peristaltic.* From fundus to the cervix. Observations in animals confirm this, but human uterus not so similar to animal uterus. Ahlfeld, in numerous Caesarean Sections could observe no peristalsis.

3. They are intermittent, *i. e.,* they recur after certain pauses. Object of intermittence is to help the circulation of the parts; during the uterine systole, little blood in the parts; during the diastole, full of blood. The contraction also forces the blood into the cervix, increasing its succulence and so-called vital dilatation. In cases where the uterus is frequently irritated or there is some obstruction to

labor, the contractions become tonic with no relaxation. Then no fluid is exuded, the vagina becomes hot, dry and red. Second object is, to allow the fetus *a change of blood;* danger to fetus from tetanus uteri, lies in asphyxia.

4. They are rhythmical, having three phases, increment, acme, decrement. The increment is longer than the acme and the decrement. Acme a few seconds. The whole contraction lasts about one minute, but this varies very much at different stages of the labor. Often a little pain will precede a stronger one.

5. They are painful.

Before labor has actively begun they are called dolores presagientes. When the os is beginning to dilate, they become quite painful—are called dolores preparantes. They seem to have their seat in different places, some cases in the back, others in the pelvis, again in the abdomen.

The first pains of labor are felt in the back, near the kidneys, and are called by the French women, "pains of the kidneys." They may be felt only as a feeling of weakness and the patient supports her back. Later the pains are felt more in the pelvis. In the first stage the pain is due to the pressure of the presenting part on the nerves of the cervix, the stretching of the same due to the dilatation of the os by the presenting part, or, some authors say, that the compression of the nerves in the wall of the uterus is causative.

The pains in the small of the back are due to radiation, such as is common in pelvic neuralgias. The nerves involved are the sacral and lumbar plexuses. The pains caused by the dilatation of the last fibres of the cervix are particularly painful (sometimes a slight amount of blood may show itself, indicating a tear in the cervix).

When the head gets down into the vagina and begins to press on the perineum, the pain is due to the stretching of these parts, and is spoken of as tearing. Dolores concassantes.

The patient now bears down and the pain cry is altered. She does not complain so much, but helps the labor along by pressing down with the abdominal muscles. When the head goes through the vulva the greatest anguish is felt, the patient feeling as if she were torn open. The pain may be so great that the patient faints (but this is rare), or is temporarily insane, due to the stretching and tearing of the vulva.

These pains are called dolores ad partum. After the birth of the child, the uterine contractions are called afterpains, or dolores ad secundum partum. They usually are not so severe as the others, but in some patients they are very painful. In the puerperium they may be so painful as to require treatment, particularly in multiparae.

The Power of a Uterine Contraction.

Duncan tried to measure it by testing the resisting power of the membranes attached to the placenta. The force necessary to rupture them varies greatly. Schatz, with an instrument, the Tocodynamometer (a rubber bag, half-filled with water, in the uterus, connected with a manometer), found the force of the uterus varied from 17 to 55 pounds, and that the power of the abdominal muscles was about the same.

The powers of labor alone may crush in a baby's head or fracture its bones. Sometimes when the doctor's hand is in the uterus, the pain squeezes it so that it cannot move, and it loses power, may be very painful. Sometimes the pains are so strong that the baby is ejected with force from the vulva (rare). Probably the usual amount of force needed for delivery does not exceed 20 lbs.

The Plastic Changes of the Fetus During Labor.

Owing to the pressure exerted by the maternal passages during labor, the head is altered in shape. The chin is pressed to the sternum, the face is flattened, the forehead also, while the occiput is made pointed. These changes are marked the more resistance is met. Should the face or other part be delivered first, the head undergoes corresponding changes. On that part of the head least subjected to pressure there appears, in long labors, a soft, boggy, circumscribed tumor. In head presentation this tumor is on one of the parietal bones. It is due to the fact that the pressure of the uterus upon the whole body of the fetus is greater than that on the small part lying over the internal os, or in the vagina. As a result, the blood in the veins cannot return from this part, there is venous congestion and exudation of serum. After the bag of waters has ruptured, this is especially likely to occur, but it may occur before this (rare).

After the head has reached the vulvar orifice, if arrested here, the vulva offers a circle of resistance and the same condition occurs, a new tumor being formed on the fetal head.

This is called the *Caput Succedaneum.* The tumor takes place in and under the scalp—not under the periosteum. It is, therefore, movable on the skull. It is soft and boggy, allowing the finger to make depressions in it. There are often small hemorrhages in the caput succedaneum and these may even be found under the periosteum.

The caput succedaneum is of importance in the post partum diagnosis of the position and presentation of the fetus, and also to determine when it is necessary to terminate a given labor. One must distinguish between caput succedaneum and cephalhematoma, which is an accumulation of blood *under the periosteum.*

Differential Diagnosis Between the Two.

Caput Succedaneum.	*Cephalhematoma.*
Is present at birth.	May not appear till few hours after birth.
Soft, boggy, pits on pressure.	Soft, elastic, does not pit.
Not well circumscribed.	Sharply circumscribed.
Dark, reddish, sometimes purple, ecchymotic.	Normal skin over it.
Passes over sutures.	Limited by the sutures to the individual bones.
Movable on skull.	Solid—can't be moved.
No prominent edge.	Edge a prominent ridge.
Disappears in a few hours, or a day.	Lasts several weeks.
Gets smaller after birth.	May appear first after birth, and even grow larger.
May sink to most dependant part of head.	Remains localized at first site.

Maternal Changes the Result of Labor.

It is not to be expected that a process requiring so much muscular exercise, such anxiety, and accompanied by such pain, can be without a strong influence on the maternal organism. The patient eats little, is usually restless and does not sleep during labor, may even have had pain at night and no sleep for a week, and this makes her exhausted. A labor lasting a few days leaves the patient weak, completely tired out. This depends on the length of the labor and the strength of the woman in the first place.

Duration of labor varies much in time, which is true also of the same woman in different labors. In the uncivilized races labor is somewhat shorter. Said that some Indian women, while the tribe is on the march, when they feel the pains of labor coming on, go off to the side in the underbrush, have the child, and, after expressing the afterbirth, hurry to catch up with the rest of the tribe.

In primiparae labors are longer than multiparae; labor is shorter in warm climates, also during summer, in poor, hardworking women than in the rich; therefore, shorter in the country than in the city.

The size of the fetus has a great deal to do with it, a large fetus, long labor. In young, strong primiparae, easier labor than in old primiparae. Old primiparae average 27 hours, but one is often surprised to see an easy labor in a primiparous patient over 40 years old. Labor is longer in fat women. Boys harder than girls, because they are larger. Primiparae, first stage, 16 hours; second stage, 1¼ to 2 hours; third stage varies from a few minutes to several hours.

Multiparae, first stage, 12 hours; second stage, ¼ to ½ hour; third stage, variable—from a few minutes to several hours.

Extremes are not rare—have had cases where labor was com-

pleted in one hour, even less. Again there are labors which are slow from the start, requiring days for completion.

The majority of labors begin between 9 and 12 P. M., and end between 12 and 9 A. M. This is not a large majority. The difference in the length of labor in primiparae and multiparae is due to the dilatation of the cervix and perineum and vulvar orifice, which in the latter is accomplished more rapidly, being soft and dilated from previous stretching.

The Temperature during labor goes up a degree, or even sometimes a degree and a half; depends somewhat on the time of day. Higher temperature is usually due to infection. The cause of this is increased muscular exertion, but that this alone can cause high temperature is very doubtful. Have seen 101° F. in a normal labor. Subsided in 12 hours.

The Pulse increases somewhat during labor, but between the pains may be normal. In the second stage, during the severe muscular exertion, the pulse rate increases a good deal, but in the third stage, if no hemorrhage be present, it is usually normal. Any marked increase must put you on your guard against hemorrhage, external or internal. Arterial tension is increased till after the third stage unless there is a hemorrhage.

The Respirations are increased during the pains, but between pains are normal. In the second stage they are more rapid, irregular and altered, as described. In the third stage, they are again normal, unless there be hemorrhage, when an increase in number, or gasping, shortness of breath, persistent yawning, shows you there is something wrong.

The Intestinal Tract; often in the first stage there is vomiting and nausea. Old midwives say "sick labors are easy." And some truth in it, as the nausea has a tendency to cause relaxation of the cervix. Once the custom to give emetics, but practice bad.

In the second stage, persistent vomiting should be suspected, as often the sign of great exhaustion. It also points to threatened or actual rupture of the uterus. In the third stage, vomiting almost never occurs, unless some pathological condition behind it, e. g., hemorrhage, ruptured uterus. After a labor is completed there may be nausea and vomiting from the anesthetic used, especially true of operations. Persistent nausea and vomiting after a severe operation must draw your attention—perhaps injury, intra-abdominal hemorrhage.

The Mental Condition of the patient during the first stage usually not different than that of a patient suffering pain. May be marked by hysterical manifestation in predisposed women. In the second stage, especially at the end, the patient may become delirious from the pain, but this is rare. Real fainting is also rare, in normal labors. Whenever I have seen it, the cause has been hemorrhage or shock.

In the third stage, the patient usually feels well. Is greatly re-

lieved after the great suffering and may fall asleep. The patient may have chills during the labor. Those occurring after the baby is born and after third stage, already mentioned. Due to the exposure of the patient, the wet bed, the loss of a source of heat (the fetus), to nervousness. Have no significance during the labor, the profuse sweating and exposure may cause them. Other patients are hot, and throw off the covers.

Between pains the patient may sleep or doze; true also in the second stage, but not so common.

Changes in the *Urine*. Amount increased noticeably. Frequent urination in the first stage, and often the full bladder offers obstacles to labor; therefore, pay attention to bladder. Sometimes in the third stage the full bladder may cause hemorrhage and retention of the placenta. Bladder may be seen and felt over the pubes. Increase of urine due to increased arterial tension. Albuminuria is common. 30%. White blood cells, red blood cells, and hyaline casts may occur in the urine during labor. Increase in NaCl. Said that peptones may occur.

The mother loses one-ninth of her weight during labor. This is made up of the child, the placenta and membranes, the liquor amnii, excretions from the skin, lungs, kidneys, etc., and blood. Average 6,564 gms., of which 5,000 the ovum, and balance the blood and excrement. These are averages: Fetus 3,200, placenta 500, liquor amnii 1,000, blood about 400 gms.

No labor (normal) is bloodless. A few cases of bloodless labor on record, but in these the fetus had been dead a few weeks. The amount of blood varies normally in wide limits. In one case of labor not over one ounce of blood lost, while sometimes it may reach 800 gms., and still be normal. Varies with the size of the woman, the character of the labor, the medical attendant, and how the third stage of labor is conducted. This loss does not affect the woman usually.

Name six periods during normal labor when a woman can have hemorrhage.

During the first stage, there may be a little hemorrhage, when labor begins, the show. Second, when the cervix is dilating, from little tears, especially toward the end. Some of the hemorrhage may come from the vagina or the vulva, especially in primiparae, but the greater part comes from the placental site, and this varies in size; therefore, the amount of blood also. A low placental site, more hemorrhage. The placenta is sometimes inverted and contains a large blood clot, and fluid blood, called the retroplacental haematoma.

Thus, there are six periods during a normal labor when hemorrhage can occur.

1. The show, which may be more or less bloody.

2. Toward the end of the first stage, when the last fibres of the cervix are giving way.

3. During the delivery of the child, through the vulva, from tears of perineum and the outlet.
4. After the delivery of child, from tears of the parts and placental site.
5. With the delivery of the placenta and in it (3rd stage).
6. After the delivery of the placenta.

The Prognosis of Labor.

Labor is physiological in most cases, but too many irregularities exist to regard it wholly in this light. In ideal labor, no deaths would occur, but we have not reached this ideal. Mortality in a general way is 1 to 175 cases, including all labors. Due oftenest to the most preventable causes, *infection and hemorrhage.*

Ninety-six per cent. of all cases are normal, *i. e.*, terminate spontaneously and with good results for the mother and child. This is the *prognosis quoad vitam.*

The prognosis quoad valitudinem is less good. Many women date chronic invalidism from a childbirth. A large number of these cases are due not to the childbirth itself, but to infection occurring at the time, or injuries inflicted by a rash attendant.

The prognosis for the child is less good—about 4½ per cent. dying in head presentations, 10 per cent. in breech presentations.

THE MECHANISM OF LABOR.

May be defined as *the art and fashion* by which the ovum is separated from the uterine wall and extruded through the vagina. In the study of the mechanism of labor we have to consider, first, the Powers; second, the Passages; third, the Passengers. After this we take up the nervous mechanism, then the various phenomena observed are explained, first those connected with the preparation of the soft parts, then those connected with the *propulsion* of the fetus, then those connected with the separation and expulsion of the afterbirth.

The Powers.

The main power involved is the uterine contraction, but there are auxiliary powers, e. g., the pressure of the abdominal muscles, the weight of the child, the elastic contraction of the vagina, gravity.

Uterine Contraction. During contraction the uterus exerts pressure on its contents, which, being fluid, suffer the same pressure all round. The uterus changes in shape, lengthens, flattens from side to side and increases in anterior posterior diameter. This occurs when the amount of liquor amnii is small. Should there be a large amount of fluid or twins, the form will be more nearly spherical.

This change in shape of the uterus is the result of several factors: (1) The fetus lies in the uterus strongly flexed; this is due to the embryonal growth of the fetus, not to the fact that the head rests on the brim of the pelvis. This curve is marked like this:
When the uterus contracts it flattens from side to side, which causes an elongation of the axis of the fetus, or extension of the spinal column. As a result of this, the uterus is stretched by the long axis of the child, at the same time that the uterus, contracting, presses on the long axis of the child. The combined result is a progression of the lower pole of the child, since the upper pole is fixed by the uterine wall. This pressure is called the fetal axis pressure. *F. A. P.* It is claimed that the extension and lengthening of the fetus can bring its head to the perineum, but there are other factors involved. Schroeder says that there is an increase of 6 c. m. in the length of the fetal axis. F. A. P. is absent in polyhydramnion.

When the uterus contracts on its contents, it exerts pressure equally in all directions (Law of Physics, pressure exerted on a fluid is distributed equally in all directions), and returns to the uterine wall, having resulted only in an increase of the tension in the uterus. This is called General Intra-Uterine Pressure. *G. I. U. P.*

General intra-uterine pressure accomplishes:

(1) The dilatation of the lower uterine segment and the part of the cervix which remains.

(2) It causes also an edema of the cervix and l. u. s. which facilitates the dilatation of these parts, so-called "vital dilatation."

(3) The formation of the bag of waters.

(4) It helps to expel the fetus.

(1) General increase in the pressure in the uterus is met by resistance all around. The resistance offered by the lower uterine segment, however, is less than that of the rest of the uterus; therefore, lower uterine segment dilates. (2) The venous circulation is impeded, wherefore, there is serous exudate, and softening of the parts. (3) Naturally, the membrane over the lower part of the uterus is forced down into the internal os, and thus the bag of waters is formed. (4) It also helps expel the fetus in this way. The contents of the uterus are forced in the direction of least resistance, that is, to the internal os. The resultants of all the lines of force will be exerted on the body A. The resistance met at BB. is the obstacle to the passage of the head. This is called the "girdle of resistance."

The General Intra-Uterine Pressure is always present. Fetal Axis Pressure may be absent in hydramnion, or small fetus, or a macerated fetus, *i. e.*, the fetus does not "keep a stiff back."

The Fetal Axis Pressure accomplishes the progression of the fetus and to a certain extent the dilatation of the os, when the bag of waters is broken.

Auxiliary Forces: The round ligaments, the uterosacral and broad ligaments. The round ligaments begin to be active early in labor; being muscular and part of the uterus, they contract also and serve to *moor* the uterus on the pelvis and to bring it slightly forward so that its axis lies parallel with the axis of the inlet. The mooring of the uterus prevents its too great retraction up over the fetus. Another function of the round and broad ligaments is that they increase the General Intra-Uterine Pressure by pulling on the top of the uterus. They thus act as a weight lying on the uterus. The uterosacral ligaments pull the cervix downward when it tends to go up with the uterus, and backward; thus keeping the uterine canal in the axis of the pelvis. They may also help a little to dilate the cervix.

The Abdominal Pressure: This is the second important force of labor, but is really auxiliary, being used in the second stage to aid labor, or acting as a reserve store of energy in the event of failure of the uterine contractions. During the first stage the abdomen takes little part in the process of labor, but in the second stage it is a powerful auxiliary, and may do all the work.

During a pain the woman closes the glottis and makes a strong expiratory effort; therefore, the diaphragm is forced down, the recti are exerted and the muscles of the flanks. There is now an enormous increase of the intra-abdominal pressure. The intestines, with their semi-fluid contents, can be compressed but little and really act like fluid, so that the general law applies here also; pressure exerted by the abdomen is transmitted equally in all directions. The uterus, therefore, receives less of the force. We have nearly the same conditions as we have inside the uterus.

The abdominal pressure, therefore, strengthens the uterine pressure.

(1) It increases the general intra-uterine pressure.

(2) It causes a transitory edema of the lower uterine segment and vagina, aiding the so-called "vital dilatation." Thus, it acts very much like the uterine contraction. It accomplishes:

(3) The expulsion of the fetus in the same manner as the general intra-uterine pressure.

The abdominal muscles are usually sufficient to expel the child alone. They are used to greater extent in pathological labor, and are very important in preventing the rupture of the uterus. The whole uterus is forced down upon the pelvic inlet by the abdominal muscles. This tends to prevent the uterus from retracting over the child and leaving it

in the stretched lower uterine segment and cervix. In the *third stage*, the abdominal pressure may expel the placenta. This occurs in 14 per cent. of the cases, and only occurs after the placenta has already been separated and lies in the lower uterine segment and dilated vagina.

Gravity. In certain labors the weight of the child may be sufficient to deliver it. In the position we use in delivery (the patient on the back or side), gravity can play very little role, but in the crouching position and in the sitting posture, when a labor chair is employed, gravity certainly has some effect. Occasionally labor occurs while the patient is standing, and then the child may fall to the ground with considerable force.

In multiparae gravity produces more effect than in primiparae, because in the latter the resistances are greater.

The Passages.

The fetus has to pass through a canal whose curve is part of a rather small circle (approximately), and which is opposite to the curve of the long axis of the fetus. Further, the fetus must bend its long axis in order to go through the canal. Again, the canal is bony in one part, above and below simply muscular and fibrous. One can best obtain an idea of how the parturient canal appears from the plate of Braune.

The bony pelvis is important in that it gives form to the soft part of the canal, and gives this the curve of the pelvis.

The Bony Pelvis. Divided into two parts by a ridge sometimes called the Linea terminalis. Upper or large pelvis, or false pelvis; lower, smaller or true pelvis. Of obstetric interest the false pelvis presents: (1) Large flaring plates of bone, called the ilia, which form supports for the uterus and child during pregnancy and direct it into the true pelvis during labor. (2) From its shape and dimensions we can form some idea of the size and form of the small or true pelvis; of vital importance in studying labor.

Three diameters of importance:

(1) The distance between the spines of the ilia, the Interspinous diameter; in the dried pelvis is 24, in the fresh pelvis 26 c. m.

(2) The distance between the crests 27, in fresh pelvis, 29 c. m., called the intercristous diameter.

(3) The diameter of Baudelocque, or the external conjugate. From the last lumbar spine to the top of anterior surface of pubis. Measures 20½ on the living.

Right External Oblique Diameter.

(1) From the right posterior superior spine of the ilium to the *left* anterior superior spine; 22½ c. m.

Left External Oblique Diameter.

(2) The left posterior superior spine to the right anterior superior spine; 22 c. m. Why the difference?

The curve of the crests is important, a nicely rounded curve indicating a normal inlet.

The true pelvis is not the same throughout its length. It is narrow above and narrow below, while between the two points it is large and roomy. The shape of the canal changes, too.

The anterior wall of the true pelvis is short, the posterior high. The outlet of the pelvis looks downward and forward, the inlet upward and forward. The canal of the pelvis describes a curve with the concavity forward. Further, the pelvis decreases in width from above downward, while its antero-posterior diameter increases. Thus, there is a difference in the contour of the pelvis at different parts. It is, therefore, best, in order to get an idea of the parts, to study the pelvis at various and characteristic levels, or planes.

I. *The Plane of the Inlet;* or (the Inlet, the Brim, the Superior Strait or Isthmus, or Margin, variously termed), is the plane bounded by the Superior Margin of the symphysis in front, the linea innominata at the sides, the promontory of the Sacrum behind.

Shape of this plane is that of a transverse ellipse, on which the sacrum intrudes posteriorly.

Diameters.

(a) *Sacro-pubic*, antero-posterior or Conjugata Vera C. V., variously named, is the distance from the middle of the promontory of the sacrum to the top of the symphysis pubis. This is the antomical Conjugata Vera, and is a little larger than the true obstetrical conjugate, which, owing to the prominence of the posterior surface of the Symphysis, must be measured from promontory of the sacrum to a point ½ c. m. below the top of the symphysis.

It is ½ of a c. m. shorter than the anatomical Conjugata Vera. It varies with the development of the pubis. This is the shortest diameter of the pelvis and the most important in all respects. Measures 11 c. m. (Obstet. C. V.)

The Oblique Diameters.

(b) Quite important, also. Extend from the Sacro-iliac synchondrosis to the Ilio-pubic tubercle of the other side. The 1st oblique is from the right Sacro-iliac joint to the left tubercle, the 2nd oblique from the left to the right, sometimes called the right and left oblique, being named from the Sacro-iliac joints. They measure 12 to 12½ c. m. Right a little longer than the left, because the rectum encroaches on the left side, and again the right half of the pelvis is flattened sometimes (causes given later).

Latin names are Diam., Diagonalis, Dextra and Sinistra.

(c) The longest diameter is the *Transverse Diameter, i. e.*, the longest distance between the linea terminalis on each side. These points usually lie 3 c. m. before the Sacro-iliac joints.

Average is 13 c. m. in the dried pelvis. In the living this diameter is encroached on by the ilio-psoas. See Mueller Handbuch, Vol. 1, pages 78-89.

II. *Wide Pelvic Plane.* Sometimes called the Mid Plane. Term still much used in Operative Obstetrics. Passing through the middle of the posterior surface of the symphysis pubis and the junction of the 2nd and 3rd vertebrae of the Sacrum, and is on a level with the highest parts of the acetabula. It is the widest part of the pelvis, is sometimes called the "Excavation," and has a very irregularly ovoidal shape with the long axis antero-posteriorly.

Diameters. Antero-posterior (not the Conjugata Vera), is 13½ to 14 c. m. Transverse 12 c. m.

Oblique diamters which run from the upper edge of the Great Sacro-Sciatic foramen to the upper border of the obturator foramen of the other side and are 13 to 13½ c. m.

The lateral diameters are encroached upon by the Obturator internus and the Pyriformis, but not very much.

III. *The Narrow Pelvic Plane*, passes through the apex of the pubic arch, the tips of the spines of the Ischii and the tip of the Sacrum. This is the narrowest pelvic plane, but not the site of the contractures of the pelvis, except in a certain type called "funnel-shaped pelvis." It is nearly circular and has a diameter of about 11 c. m. The distance between the two ischiatic spines is 10½ c. m. Important line to remember, since the descent of the head is determined from this line.

IV. *Plane of Outlet.* Passes through the arch of the pubis, the tuberosities, the rami of the pubes and ischia, the great sacro-sciatic ligaments and the tip of the coccyx. This is really two planes, bent one on the other at the tuberosities, but during labor the head pushes down the coccyx and brings the two planes nearly into one continuous line. This plane is not constant at its posterior part, since, owing to the distensibility of the ligaments, its posterior part can be much increased in size.

Antero-posterior Diameter—9½ c. m., which can be increased 2 or 2½ c. m. Transverse diameter, 11 c. m.; cannot increase in size, since it is between the two tuberosities of the ischia.

V. *Another Plane*—more arbitrary than the others, called the *2nd parallel plane*, from under the edge of the symphysis, parallel to inlet. Very wide plane and not encroached on by muscle. A line connecting the centers of all these planes describes a curve, with its concavity anteriorly, which, if continued upward, would strike the navel; it is called the *Axis of the Pelvis*—or line of Direction, or the Curve of Carus. It is the center (about) of the path followed by the head in its progress.

An important measurement, is the distance from the under surface of the Ligamentum Arcuatum to the tip of the promontory of the Sacrum, called the Conjugata Diagonalis. It is important in that it enables us to determine the Conjugata Vera, since we have hardly any other way of doing it.

To get to the Conjugata Vera directly is very difficult and uncertain. Conjugata Diagonalis, or C. D., is about 12½ c. m. In a normal pelvis deduct 1½ c. m. to find the Conjugata Vera, in rachitic, deduct 2 c. m. When you feel that the symphysis is too high, you must deduct more. The angle the pelvis makes with the inlet must also be considered in making the estimate.

Another important measurement is the External Conjugate, or the Diameter of Baudelocque. This is measured from the depression below the spinous process of the last lumbar vertebra to the top of the symphysis. It is 20½ c. m., from which deduct 9½ c. m., to get the Conjugata Vera. This measurement is quite uncertain, as the Sacrum may be more or less thick.

Hodge of Philadelphia, to whom we owe a great deal in obstetrics, from the study of the pelvis by means of plaster casts, drew a plane perpendicular to the inlet and passing transversely through the ischiatic spines. Together with the muscles and fasciæ of the pelvic floor, two inclined planes resulted, one leading downward and forward, the second, downward and backward, so that any body striking these planes, if anterior, would be allowed to slip under the pubis; if posterior, toward the sacrum. These two planes are important in the study of labor. They are called inclined planes of Hodge.

The Inlet makes an angle with the horizon of 55 to 60 degrees. This varies with the closeness of the knees and the amount of rotation, being increased with abduction and outward rotation. This is called the Pelvic Inclination. Formerly believed to have great bearing on Mechanism of labor, but now not so. Varies from 40 to 100 degrees, even while standing. When patient is lying horizontally it is about 25 degrees below horizontal line. When patient lies flat, the pubis and the anterior superior spine ought to be in a horizontal plane. This is a good method of determining a normal pelvic inclination.

In placing a dry pelvis at the proper angle to the horizontal, see that the Anterior Superior Spines and the pubic tubercles are in a vertical plane and that the acetabular notch looks directly downward.

The *angle which the symphysis* makes with the plane of the inlet is 100 degrees, but this varies, being less in a flat rachitic pelvis.

The Line of Direction of a woman standing in the military attitude, with the shoulders thrown back, passes through the atlas, the 6th Cervical, the 9th Dorsal, and the 3rd Sacral vertebræ. When the shoulders and head are allowed to fall forward the line falls in front of the sacrum. To counteract this, the pelvis is projected forward, the thighs extended. In certain anomalies of the spine, e. g., Pott's Disease, the displacement of the Line of Direction plays a part in the production of the deformed pelvis.

The pelvis of a new-born child is long, narrow, converges from above downward. The sacrum is long, the bodies do not project from the wings, the wings are short and the antero-posterior diameter is long, the transverse short, high promontory, not marked. There is very little difference in the male and female pelves of new-born children. Highly important is to study the causes which bring about the adult form of the pelvis. In general, two causes:

1. *The inherent property of growth* of the bones. This is shown particularly by the excessive development of the wings of the sacrum, in girls, and also the growth of the pelvic bones.

2. *Mechanical factors,* of which the most important is the body pressure.

The three bones of the pelvis are put together so that the sacrum does not act like a wedge, or keystone, but is movable, so that it can sink down between the two innominate bones.

In the growing child the line of direction falls through a point somewhat anterior to the sacrum. This causes pressure to be exerted on the 1st sacral vertebra. The lower end of the sacrum is prevented from going backward by the strong sacro-sciatic liga-

ments. Therefore, the sacrum is bent on itself at the 3rd sacral vertebra. There is a tendency also for the sacrum to increase its curve laterally, but this is counteracted by the projection of the bodies of the vertebræ downward and forward.

The body pressure also forces the whole sacrum and, of course, the promontory, more into the pelvis; when the sacrum goes down, it puts the ilio-sacral ligaments on the stretch and gives the posterior iliac spines the tendency to approach each other. This would be attended with a separation of the symphysis were this joint loose. Let us call this tendency of the innominate bones to separate at the pubis, because of the ilio sacral ligaments tugging at the posterior spines, "transverse tension." A marked tension posteriorly with soft bones, but fast symphysis, would result in the approach of the symphysis to the promontory. But this is counteracted by the pressure of the heads of the femora in the acetabula, which forces the bones upward and inward. Let us call this pressure *"lateral pressure."*

A harmonious operation of all these three mechanical factors causes the pelvis to assume the beautiful oval shape we know. All the deformities can be referred back to the anomalies of growth or faulty or insufficient action of one or more of them, e. g., in congenital split pelvis (where no union exists in the symphysis), the ends of the pubic bones are widely separated from each other, showing the effect of transverse tension with mild or absent lateral pressure.

In cases where the patient walked late in childhood, or not at all, the "lateral pressure" falls away and the pelvis is under the influence of the transverse tension. It, therefore, flattens out, the symphysis coming nearer the promontory, and we get the flat pelvis, which is usually rachitic.

The development of the internal genitalia has a decided influence on the development of the pelvis. In congenital atrophy of the uterus, or infantile uterus, the pelvis does not develop so well, retaining more or less the infantile form. In a pelvis in Bonn the diameters are excessively large, the patient having had a double uterus, showing the action of the opposite condition.

The inherent tendency of the growth of the bones must not be overlooked, *i. e.*, the lateral growth of the sacrum and of the rami pubis. These would tend to increase the transverse tension. In some cases one side of the sacrum does not grow, then we have the irregularly contracted or Naegele pelvis.

Influence of Race, Individuals, on the Pelvis.

A perfectly symmetrical pelvis is a great rarity. Almost always some irregularity. Tramond, of Paris, says that 1 in 5,000 is perfectly symmetrical.

Regarding Race. There are in general four forms:

I. A transverse ellipse.

II. A heart-shaped pelvis

III. A round pelvis

IV. An antero-posterior ellipse.

The first characterizes the European women, and is possibly due to the fact that walking later than the savage tribes, her transverse tension is not so easily counteracted by the lateral pressure. The second form also occurs in the Caucasian race. The round pelvis in African negresses, and to a certain extent in the Bush women of Australia and the North American Indian, in whom the antero-posterior ellipse may also be found. English women have large pelves, while Jewish women have small pelves; Irish women have aiso large pelves, Germans also, but the French are likely to have small. Pelves with the longest transverse diameters are found in the English and North German women.

The environment of the patient has a great deal to do with it. Small pelves are rare in this country, except among the foreign-born population.

ANATOMY OF THE PELVIS.

Soft Parts: The inlet of the pelvis is encroached on by the iliopsoas on each side, about 1½ c. m. Posteriorly on the left side is the rectum. This is an obstruction only when filled. This is not a rare cause of dystocia, therefore take the hint.

The mid-plane is encroached on by the obturator internus, and posteriorly by the pyriformis, very slightly, however. The nerves in the pelvis make no obstruction to labor, but the pressure which they undergo is the cause of the neuralgic pains running down the leg, and up the back. The peritoneum and the fat in the pelvis count very little in the general configuration of the parturient canal. Dr. Hodge took some plaster casts and proved this.

What interests us most is the so-called *pelvic floor*. The pelvic floor consists of that portion of the soft parts which fills out the irregularly-shaped outlet of the pelvis.

A great many parts enter into its formation, the pelvic fascia, the coccygeus and levator ani muscles, the constrictor cunni, the deep transverse and superficial transverse perinei muscles, fat and the organs, rectum, vagina and bladder.

The pelvis may be said to be bounded below by a diaphragm, the pelvic diaphragm, similar to the diaphragm separating the chest from the abdomen. This diaphragm is made up of the levator ani, the

coccygeus, and the pelvic fascia, some above and some below this. It is perforated by THREE openings, the rectum, the vagina and the uretha, besides by numerous vessels and nerves.

The diaphragm is attached anteriorly to the posterior surface of the rami of the pubis, leaving a space 2½ c. m. wide behind pubis, which is not complete. It extends across the opening of the obturator foramen, from which it is separated by the obturator internus muscle, to which it is attached by a fibrous band called the white line. It reaches the inside of the ischium about the level of the spine, to which it is attached also; thus far it is made up of the levator ani. Now the coccygeus begins, and the posterior portion of the pelvic diaphragm is made up of this muscle, which extends across the great sciatic notch and spreads out over the coccyx.

The space of the great sciatic notch is filled with connective tissue and the structures passing through it. For our purpose we can consider the planes of connective tissue which pass to the sides of the pelvis as forming part of the diaphragm and a very important part.

The attachments of the two sides, of course, are exactly the same. The muscles and fascia from the two sides pass downward and inward toward the median line. Posteriorly, they come together on the coccyx, *i. e.*, that part formed by the coccygeus; anterior to this the levator ani muscles come together, interlacing in the median line. On a plane about the level of the posterior surface of the ischii the rectum passes through the levator ani; a little further anteriorly there is the vagina passing through, separated from the rectum by a reflection of the muscle. The diaphragm is now complete, two sides extending up to the rami of the pubis.

Thus, you see, the pelvic diaphragm is a horse-shoe shaped muscular (also fibrous) septum attached to the sides of the pelvis, passing down and inward to meet in the median line attached to the coccyx behind, allowing the rectum to go through it, and leaving an oval opening anteriorly for passage of the vagina with the urethra.

Beneath the pelvic diaphragm lies the diaphragm-pelvico-urogenitale, the ischio-rectal fossae, the perineum, the vulva, and its glands. Since these have only secondary importance in mechanism of labor, we will leave their consideration till later. See Sellheim.

The pelvic floor makes a *gutter* leading down to the arch of the pubis, so that any body free to move, placed on it, will slide down under the pubis.

Posteriorly, the diaphragm is attached to the coccyx, which is movable, and the diaphragm possesses a high degree of elasticity and dilatability. The degree can be felt from the vagina and the rectum and the patient has so much voluntary control of the diaphragm that she can compress a body placed in the vagina. Dickinson put some moulds of putty in the vaginal outlet and had the woman compress

them. The muscle hypertrophies in some cases of vaginismus and may prevent the immissio penis, or the exit of the fetal head.

During labor, the diaphragm is forced down, the coccyx forced back, the fibres of the diaphragm are separated from each other and the muscle is shaped like this:

Between the vagina and rectum, passing with its apex up to the diaphragm, is a pyramidal body, the *"perineal body."* Its base is the skin between the anus and vulva; anteriorly, the vagina and fossa navicularis; posteriorly, the anus and rectum.

It is made up of perineal muscles, and sphincter cunni anteriorly, the sphincter ani, posteriorly; the levator ani enters it at the apex as it goes between the vagina and rectum. The rest is fat and connective tissue. At the sides are the ischio bulbous and cavernosus muscles.

This body has a high obstetric importance, but not so much as the pelvic floor diaphragm. It may be considered as part of the second diaphragm placed beneath the first and made up of the fat, the vulva, the muscles surrounding the vulva, the skin of the perineum and the anus.

During labor the apex of the perineal body with the levator ani, to which it is attached, is pushed backward by the advancing head. The base is flattened out, *i. e.*, the side toward the vagina and vulva is carried downward and forward. The constrictor cunni is displaced downward and forward, forming part of the pelvic diaphragm now. The perineal body is thus flattened out and lies flat on the stretched and dilated pelvic floor diaphragm and vagina.

The bladder is situated behind the pubis in its empty condition, in front of the vagina and uterus, to which it is attached. When full it pushes back, and its fundus rises above the symphysis into the abdomen, usually to one side.

Some of the fibres of the levator ani are attached to its base and the pelvic fascia forms ligaments for the bladder and the urethra. Owing to the attachment of the bladder to the lower uterine segment during the dilatation of the latter in the first stage, the bladder is drawn up out of the pelvis, becoming an abdominal organ. This puts the urethra on the stretch, elongates it and gives it a direction

LANE MEDICAL LIBRARY OF
STANFORD UNIVERSITY
300 PASTEUR
PALO ALTO, CA 94305

off to one side (to which the bladder is). Point to be remembered in catheterization.

The vagina becomes dilated so that it lies on the pelvic diaphragm all around really forming an upper layer for it. Thus, when the pelvic floor tears, the vagina usually takes part. Sometimes the floor tears, the vagina remaining intact. This should be recognized after labor. Sometimes the muscle tears from the pelvic wall. The rectum is pushed back directly against the coccyx and sacrum by the advancing head. Owing to the downward and backward displacement of the anus, the downward and forward displacement of the perineal body, and the tension from the two sides, the anus is open and its anterior wall becomes visible.

The two pelvic segments, the sacral and pubic, are thus separated by the advancing head. The pubic segment, uterus, vagina, bladder, and urethra are drawn up, the sacral segment, rectum, pelvic floor, and perineum are pushed down. The action may be likened to a body passing through swinging doors pulling one toward him and pushing the other away. The skin is simply stretched over all like a tight cap with a split in its anterior portion, through which the child comes. Describe the parturient canal; see plates of Braune. Hodge's casts.

THE PASSENGERS.

We next take up the consideration of the passengers,—the fetus and the secundines. The position of the fetus in utero and the points which characterize the maturity, have already been given, in the physiology of pregnancy.

The larger and more important part of the fetus is the *head*, the shoulders being so soft and compressible, that they present usually little interest in normal labor. Do not underestimate them, however, as they may give rise to dystocia and, what is more, may directly cause the death of the mother or fetus, or both when too large, or when they come in a bad position.

The fetal head at term is an irregularly ovoidal body, anteriorly narrow, broad behind.

The four large squamous bones, which make up the vault of the cranium, are connected together by sutures. At the junction of the sutures there are spaces filled with the membrane, in which the bone is formed. These are called fontanelles.

The sutures are, anteriorly between the two halves of the frontal bone, frontal suture; laterally, between the frontal and parietal bones, is the coronal suture; in the median line, on the vertex, is the sagittal suture, the most important; and behind, between the parietal and occipital bones, the lambdoidal suture.

At the sides, between the parietal bone and the temporal, on each side, are the lateral sutures.

At the junction of the frontal, the sagittal and the coronal sutures, is a lozenge-shaped space, the anterior or large fontanelle. Its size depends on the degree of ossification of the cranial bones, but it offers no index as to the maturity of the child. The shape of the fontanelle is important in that by it we can distinguish the position which the fetus holds in utero. It is characterized by four sutures running to it, and second by the fact that one angle is obtuse, the other acute and long. The short, obtuse angle points always toward the occiput, or posterior pole of the head, the long, acute angle points to the face. The anterior pole of the fetal head is called the *sinciput*, and is about the highest part of the forehead. The occiput is the prominence of the occipital bone.

Posteriorly, where the sagittal suture meets the lambdoidal, a triangular space exists, called the posterior or small fontanelle. This, during labor, or often at all times, is felt, not as a space, but as a meeting of three sutures. It is characterized by the fact that there are *three* sutures, not *four*. The concavity of the angle which they make, points to the occiput.

It sometimes happens that at some point in the sagittal suture there is a quadrangular space, an accessory fontanelle; this is usually about half-way between the two fontanelles, four cornered. It may lead to diagnostic mistakes unless it be recognized.

Laterally, where the lambdoidal suture meets the lateral suture, a space may be felt, like a fontanelle, which may also be diagnosed as either the anterior or posterior fontanelle. This mistake is avoided by the palpation of the ear directly alongside of it. Sometimes the spaces of the fontanelles (not the anterior) are filled with an extra plate of bone, from which ossification goes on independently. These are called, Wormian bones. The parietal bones on each side have a prominence which may be more or less marked. Sometimes this is quite pointed. They are called the *parietal bosses* and they mark the point where the head meets with the greatest resistance in passing through the pelvis.

The rest of the head interests us only as regards the measurements. To study the mechanism of labor it is important to know the dimensions of the head.

Diameters:

Bi-parietal, 9½. Bi-temporal, 8½ c. m.
Occipito-frontal, 11. Occipito-mental, 13 c. m.
Sub-occipito-bregmatic, 9½ c. m.
Bis-acromial diameter is 11 c. m. Bi-troch, 10 c. m.

Circumferences:

Occipito-frontal, 34 c. m.

Sub-occipito-bregmatic, 31 c. m.

Baby is 50 c. m. long. At the 5th month is 26 c. m. long, and gains 5 c. m. a month. It weighs 3,200 grams on an average.

In general, small women have small babies; large women, large babies. Short, fat women are an exception, as they often have large, fat babies, but in them the pelvis is usually of normal shape, and of good size, so there is no dystocia. Still, fat women are liable to post partum hemorrhage, so that labor in them requires watchfulness.

The shape of the fetal head bears some relation to the mother's head; said that it is a miniature of hers, but this is not always true.

The shape of the head may vary much, both from the moulding during labor (which soon disappears), and from congenital forms of growth and of changes due to premature union of the sutures (*synostosis.*)

I. Dolichocephalus—elongation of occipital portion of head.

II. Scaphocephalus (first named by Ernst v. Bear).

This is due to a too early synostosis of the parietal bones. Therefore, the head is boat-shaped, Bi-parietal, less than Bi-temporal diameter.

III. Trigonocephalus — premature synostosis of the frontal bones.

The fetal head bears some relation to the father's, in that a large father will have a large child. Thus it happens that a small woman sometimes bears a large child.

The number of the pregnancy has some relation also to the size of the child, as before stated, the second pregnancy generally a small child, after this, an increase of 5 to 8 ounces, with every baby, till the seventh or eighth, when usually a decrease begins. In primiparæ the head is larger proportionately to the shoulders than in multiparæ. The latter also have fatter babies.

The fetus presents itself for labor in a variety of positions. It may present any part of its anatomy to the parturient canal.

Definition. The *presentation* of the fetus is determined by the part which is touched by the examining finger or is bounded by the girdle of resistance. That part of the fetal ovoid that offers at the inlet is the presenting part.—D. M.

Definition. The *position* of the fetus is determined by the relation of a given point in the presenting part to certain points in the periphery of the pelvic planes. The relation of certain land marks on the presenting part to certain land marks in the pelvis.—D. M.

Definition. That point of the presenting part which is used for determining the position is called the "Point of Direction." It varies with the different parts, e. g., in occipital presentation, the occiput; in breech presentation, the sacrum; in shoulder presentation, the scapula; in face presentation, the chin.

The classification of the presentations which is generally recognized is that adopted by the 9th International Medical Congress at Washington in 1887.

I. *Cephalic Presentation.*
Including Vertex and varieties.
Face—Brow and varieties. These depend on the degree of flexion of the head.

II. *Breech Presentation.*
Including Double or Complete Breech.
Footling or Knee presentation.
Single Breech.

III. *Transverse Presentation.*
Including Shoulder—Trunk presentation.

The presenting part occupies such a position in the pelvis that its point of direction looks either to the right or to the left, behind or forward. For convenience of description the pelvis is divided into four quadrants—an anterior left, an anterior right, a posterior left and right. The position is defined according to that quadrant in which the point of direction lies.

All terms *as to direction* apply to the *mother,* in the erect position. The term *upper* means the part in the direction of the fundus uteri; *lower,* the part nearer the vulvar outlet; *anterior* means the direction to the front; everything, as was said, in reference to the mother.

In Cephalic presentations, considering vertex, or as it is usually called, occipital presentation, first, we have

I. Occipito Læva Anterior—*O. L. A.*
II. Occipito Dextra Posterior—*O. D. P.*
III. Occipito Dextra Anterior—*O. D. A.*
IV. Occipito Læva Posterior—*O. L. P.*

The occiput is the point of direction. There is no reason for adding the word iliac (the letter I) to indicate that the head is near the ilium.

When the *Face* presents, we have:

I. Mento Dextra Posterior—*M. D. P.*
II. Mento Læva Anterior—*M. L. A.*
III. Mento Dextra Anterior—*M. D. A.*
IV. Mento Læva Posterior—*M. L. P.*

Point of direction is the *chin.*

When the *Brow* presents we have the same divisions substituting "fronto" for "mento." We have all degrees of deflexion and it is not necessary or wise to enter each in general classification.

When the *Breech* presents:

I. Sacro Læva Anterior—*Sac. L. A.*
II. Sacro Dextra Posterior—*Sac. D. P.*
III. Sacro Dextra Anterior—*Sac. D. A.*
IV. Sacro Læva Posterior—*Sac. L. P.*

Point of Direction is the sacrum.

Footling and Knee presentations are named after the Breech.

When the *Shoulder* presents:

I. Scapula Læva Anterior—*Sc. L. A.*	Back anterior
II. Scapula Dextra Anterior—*Sc. D. A.*	positions.
III. Scapula Dextra Posterior—*Sc. D. P.*	Back posterior
IV. Scapula Læva Posterior—*Sc. L. P.*	positions.

Point of direction is the scapula.

To this classification two additions ought to be made, (a) one to determine the relation of the head in a vertical plane, that is, its distance from the vulvar outlet, and (b) one to designate those positions of the head when its long axis is in the transverse diameter of the pelvis. For the latter the writer suggests the term transverse, and thus we have O. L. transverse when the occiput points to the left, and O. D. transverse when the occiput points to the right.

For the former condition the writer has used the term degree of engagement. Mueller suggests the word "station." A head is "not engaged" when its greatest diameter is still above the plane of the inlet. If freely movable, we call it floating or caput ballitabile. A head is fixed on the inlet or "engaging" when the largest diameter is just about to pass the inlet—caput mobile. A head is "engaged" when the largest diameter has passed the plane of the inlet—caput ponderosum. A head is "deeply engaged" when the lowest part of the head rests on the pelvic floor. A head is "at the outlet" when the largest diameter is passing the bony outlet. The perineum is bulging at this time. A head is "on the perineum" when the largest diameter has passed the bony outlet and the head begins to show in the vulva.

Attitude. This is the relation of the various parts of the anatomy of the fetus to each other. The normal attitude of the child is one of flexion of all the joints. Attitude may be disturbed by the arms leaving the chest, the legs leaving the abdomen and prolapsing or the cord prolapsing, the chin extending (making face presentation).

Frequency of the Presentations.

Carl Braun's Clinic—48,449 cases about 1865 to 1875. Vertex, 95 9-10%. Face, 6-10%. Pelvis, 2 7-10%. Transverse, 7-10%. Of the vertex presentations 70% were O. L. A. and 29% O. D. P. 1% the other two presentations.

Causes of the Presentations and Positions.

1. *Gravity.* If a fetus is placed in a fluid having a specific gravity similar to that of liquor amnii, it will float with the head down and the right side a little lower than the left (liver). In the latter months of pregnancy, the head sinks into the lower uterine segment.

2. *Law of Accommodation of Pajot.* Where an ovoidal body is

in an ovoidal container, the long axes tend to become parallel. Especially true when the container contracts as does the uterus. This is assisted by the steadying action of the abdominal walls. Multiparæ and women with lax uteri and abdominal walls are likely to have mal-presentations, while primiparæ seldom have them: said that the proportion is 7 to 1. The active movements of the fetus tend to force the head down. Influence of hydramnion in producing mal-presentations—great mobility conferred, therefore child lies in any position when labor begins. Size of the fetus—lack of mobility, therefore head presentation, usually with large children. Maturity of fetus, same as size, premature labors *often breech. Abnormalities of the fetus,* for example, hydrocephalus, anencephalus, predispose to breech. *Accident.* When the patient is brought suddenly to labor with the fetus in bad position.

Shape of the Uterus. In uterus arcuatus, find shoulder and breech presentation. Contraction of the pelvis, presenting part cannot go in, so glides off. During pregnancy the presentation and the position change frequently. In primiparæ after lightening the position is usually but not always fixed. In multiparæ it may change up to the beginning of labor. Changes are mostly breech to vertex and transverse to vertex. Head to breech and transverse to breech are rare. What are the causes of the various positions of the child?

Nervous Mechanism of Labor.

Quite complicated and by no means certain as yet.

Nerve Centers.

1. A center is believed to exist in the cortex.
2. A reflex center called the parturition center exists in the medulla, but the importance of it is variously estimated.
3. A center in the lumbar enlargement of the cord.
4. Independent nervous centers in the uterus. This is proven by the fact that labor can occur in cases where all connections with the spinal cord are cut off. 1st, cases of paraplegia, and experimentally after section of the spinal cord. This center is supposed to be the great cervical ganglion.

Nerves.

1. Motor fibres are derived from the aortic and hypogastric plexuses, sympathetic.
2. Sensory fibres pass along the sacral nerves to the spinal cord. Thus generally in cases of paraplegia labor is painless, and the injection of cocaine into the spinal canal affects these fibres, producing anesthesia of the region supplied by the nerves of the cauda. The action of the uterus is undisturbed.

LABOR MECHANISM IN OCCIPITO LAEVA ANTERIOR.

Movements imparted to the fetus.

For the study of these movements a multipara offers better advantages than a primipara because in the latter the head is already engaged, while in the former it does not engage until the labor. The head lies over the inlet more or less median, being inclined more or less on either shoulder. This latero flexion of the head brings the sagittal suture nearer the promontory or the pubis and one parietal bone lower than the other. When the head lies in the inlet with the sagittal suture midway between the pubis and promontory it is said to be synclitic or in synclitism. When the sagittal suture is nearer one than the other the head is asynclitic. As the head descends into the pelvis this asynclitism disappears, the sagittal suture becoming median. The motion is called the synclitic movement, or "levelling." In pathological cases the asynclitism is marked, a pronounced anterior or posterior parietal bone presentation being present, or the asynclitism may persist till the head reaches the pelvic floor and interferes with internal anterior rotation.

I. The head enters the pelvis in the *right* or 1st oblique diameter; it may be more transverse, but unless the pelvis be contracted, it seeks the oblique; reason of this, the greater length of the diameter, the transverse diameter being encroached on by the iliopsoas on each side. The head enters the pelvis with the chin flexed on the sternum. The reasons for this are, 1st, the normal position of the fetus from the early weeks, is one of flexion; 2nd, in the inlet, certainly after the head has reached the chief pelvic plane (*i. e.*, about the level of the pyriformis) it meets with resistance. The head therefore descends in the pelvis in a flexed condition, undergoes little change till it reaches the chief pelvic plane. The *flexion* or *first movement* is increased by the resistance which the head meets. The head may be considered as a two-armed lever balanced on a point lying in the condyles of the occipital bone. The short end of the lever lies toward the occiput, the long end toward the sinciput.

The force is applied through the spinal column to the condyles. The resistance is the same all around and therefore the short end of the lever must sink; this serves to increase the flexion already begun; the sinciput goes up, the occiput goes down. Under certain conditions this flexion may be so great that the occipito-frontal diameter coincides with the long axis of the fetus. A generally contracted pelvis does this, and coming to a case in which the flexion is extreme you may diagnose a generally contracted pelvis.

The mechanical gain in flexion is that instead of an occipito-frontal diameter of 11 cm. and circumference of 34, we get a suboccipito-bregmatic diameter of 9 cm. and circumference of 31 cm. Time when—place where—

Flexion occurs at the end of the first stage or at the beginning of the second stage in multiparae. In primiparae almost always first stage.

Place where, already mentioned, in the mid-plane.

II. Coincident with this is the *descent* of the head. This is called the *second movement,* and occurs in the axis of the *inlet.*

Descent is the result of three factors. 1. General intra-uterine pressure; 2. Extension of the fetal body; 3. Gravity. Descent is continued till the head reaches the pelvic floor. During the descent, the head strikes the lateral plane of the pelvis the left *anterior inclined plane.* This directs the occiput towards the arch of the pubis, and brings about the *third movement*—

III. *Internal Anterior Rotation.* In this movement the small fontanelle comes anterior, the sagittal suture, which was in the right oblique, comes to lie antero-posteriorly. There are several factors causing the anterior rotation of the occiput. 1. The lateral inclined planes of the pelvis together with the gutter formed by the pelvic floor. 2. The back of the fetus tends to come anteriorly, since, owing to the loss of the liquor amnii, the uterus tends to flatten out and the convex back of the fetus cannot accommodate itself to the side of the uterus as well as to the front. The rotation of the trunk is transmitted to the head and this assists the action of the 1st factors. Can act only when the head is flexed, because then the neck is curved and rigid and the chin rests on the sternum. 3. The fact that the rami of the os pubis converge anteriorly forming ways, similar to the ways of a ferry boat pier, directing the occiput to the front.

The back does not rotate to a point directly anteriorly, but remains about 30 degrees behind the head. Internal anterior rotation is a very important part of the mechanism of labor. *Without it,* under normal circumstances, delivery could not occur. If the pelvis is large or the head very small the latter may pass out transversely.

When the head has rotated and has come to lie on the pelvic floor it is prevented from rotating back again by the sling-like levator ani, and is directed downward and forward.

It is believed that the pelvic floor is mainly causative of rotation, the other factors playing a lesser role. The ease and rapidity of the anterior rotation depends greatly on the flexion of the head; unless same is flexed it will be delayed or absent.

Time When, Place Where—

This movement occurs when the second stage is nearly ended in multiparae; in the second stage or sometimes in the first in primiparae. Occurs when the head has reached the cavity of the pelvis, in a plane a little below mid-plane. Sometimes, however, the head goes straight down to the pelvic floor with the sagittal suture, still in the oblique diameter, then it suddenly rotates, or rarely the rotation is completed in the vulva, or not at all.

Fourth Movement.

IV. After the head reaches the pelvic floor, rotation being completed, descent and extension of the head now occur. After the head slips down under the pubic arch, the occiput becomes fixed.

Now the fetal axis pressure works on a one-armed lever and the sinciput descends. When the head reaches the pelvic floor it strikes an inclined plane. The force meets the resistance of the plane and by resolving the forces we see the head slide down the plane. This brings the occiput under the symphysis. Now the Fetal Axis Pressure acts at a different angle, in a direction more posteriorly, which serves to force the sinciput down, *i. e.*, to deflex it.

Another explanation is this: General Intra Uterine Pressure acts equally on the head in the parturient canal, and forces it along the gutter of the pelvic floor. Owing to the shape of this, head must follow the curve.

The occiput being fixed under the pubis, the forehead, face and chin roll over the perineum, the center of rotation being a line drawn through the occipital condyles posteriorly.

Time When, Place Where—

In primiparae and multiparae at the end of the second stage. At the outlet of the hard pelvis and the outlet of the soft pelvis.

Fifth Movement.

V. After the head has escaped, the occiput slowly turns to the left side, the face to the right. This is due to the internal rotation of the shoulders, and, second, to the slight twisting which the neck has undergone, now being untwisted.

The shoulders enter the inlet in the left oblique, and rotate anteriorly in the same manner as the head, but the anterior shoulder comes anteriorly from the right side of the pelvis. This causes the head outside to rotate in the same direction. This movement is

aided by the untwisting of the neck. It is called *External Restitution.* This does not invariably occur. Thus there are five movements of the head, flexion, descent, internal anterior rotation, extension, external restitution.

Mechanism of the Shoulders.

The shoulders enter in the oblique diameter opposite that taken by the head. The anterior shoulder passes through the same mechanism as the occiput and rolls under the symphysis, the posterior shoulder sliding along the pelvic floor.

The anterior shoulder stems under the symphysis while the posterior shoulder rolls over the perineum, then the anterior shoulder comes out from behind the symphysis. This mechanism is not constant, sometimes the shoulders do not rotate but come out somewhat obliquely, or even transversely (rare). Or the posterior shoulder may stay behind the perineum till the anterior shoulder is delivered.

Seldom any trouble with the shoulders unless they are too large, but their exit must be watched and they sometimes tear the perineum even if the head passes through safely, or may increase a small tear.

What One Feels of the Mechanism of Labor.

At the beginning the head is high up in the pelvis, and you must press the perineum well back to reach it.

In multiparae the head is still movable, *"caput ballitabile."* If the cervix is dilated, through the bag of waters, you can recognize the head and usually can feel a suture, running nearly in the right oblique. Passing to the left anteriorly, following the suture, you reach the *small fontanelle.* This is an important finding. It points to the left ilio-pubic tubercle, lies in the left anterior quadrant of the inlet.

The sagittal suture generally runs midway between the promontory and the symphysis, but it may be found more transversely and running close to the promontory—anterior synclitism. This is because the axes of the uterus and the child do not correspond with that of the pelvis. The head, therefore, lies over the inlet with the anterior parietal bone lower than the posterior. The sagittal suture is, therefore, displaced upward and toward the promontory. This is called Naegele's obliquity. In normal cases this is sometimes present, and when present is always moderate. In pathological cases, however (especially flat rachitic pelves), the sagittal suture may run quite close to the promontory so that the ear is presenting over the inlet. Dangerous cases.

As has been said, the head enters the pelvis in the oblique diameter. This has been called the obliquity of Solayres. The position of flexion of the head on the chest is called the obliquity of Roe-

derer. Of these the obliquity of Naegele is the only one of importance. When the head is high up, flexion not having occurred, you may also reach the large fontanelle. It is a little higher than the small. When the head has descended and flexion occurred, the head is reached easier, the small fontanelle lies to the left anteriorly, the large fontanelle can usually be reached, but is high up to the right sacro-iliac joint and hard to get. Sagittal suture in right oblique. Naegele's obliquity, if present at first, exists no more. The head is now fixed in the inlet, "caput mobile." Can be pushed up, but with difficulty. When the head has descended so that the lowest point lies in a line drawn between the two ischiatic spines, the head is fixed, or "engaged" "caput ponderosum."

The head is engaged when the largest plane, the one through the bi-parietal diameter, has passed the plane of the inlet. What are the signs by which we may determine whether engagement has or has not occurred? The head is engaged when, first, the most dependent portion has passed the "interspinous line"; second, when two-thirds of the sacrum are covered; and, third, when three-fourths of the symphysis are covered by the head. Never operate till you know whether the head is engaged or not.

When anterior rotation is complete, the small fontanelle has come to the median line in front, and the sagittal suture into the antero-posterior diameter of the plane of the outlet. By this time in long labors the caput succedaneum has begun to form, which may make the landmarks on the scalp hard to find. By even pressure with the finger, one can usually obviate the difficulty. The perineum now begins to flatten out, then to bulge. This soon becomes greater, and now during a pain the lips of the vulva are separated and one can see the head. After the pain is over the head recedes, but comes down further with the next pain. This is a continuation of the movement from the start, there being advance and recession alternating. The head is said "to feel its way." The vulva opens more and more, thick mucus comes out, the parts being very succulent. Finally the head is expelled, etc.

By abdominal examination the progress of labor is determined by the palpatory findings and auscultation, until the head is well down on the floor of the pelvis. The fundus of the uterus lies high up, near the ensiform, the progression of the head being accomplished by the extension of the fetus. At first the shoulder may be felt directly anteriorly, but as rotation is completed it goes to the right side. The heart tones heard at first between Poupart's ligament and the navel in front, sink toward the pelvis, at the same time nearing the median line. In forceps operations, therefore, listen just above the symphysis near the hair margin. The rotation of the head can likewise be followed by the hand palpating through the abdomen. The head is grasped firmly and its position noted. The

forehead rises in L. O. A. as flexion occurs, and rotates behind with the internal anterior rotation of the occiput. The advancement and engagement of the head can also be determined from the outside, by noting the depth which the hands must be pressed to reach the head.

The Mechanism of Labor in Right Occipito Posterior.

Mechanism the same, but the third movement, internal anterior rotation takes more time. The occiput descends, the chin flexed as usual. Very soon the occiput strikes the posterior part of the right lateral inclined plane. If the pyriformis is well developed, if the spines of the ischium are normally incurved, the plane is well developed and the occiput is directed anteriorly. This movement is assisted by the trunk turning anteriorly. Should there be a rather large pelvis with poorly marked lateral planes, the head will sink to the floor of the pelvis with the occiput directed more or less posteriorly. Rotation now takes place so that the sagittal suture comes to lie in the transverse diameter, later in the left oblique and in the antero-posterior, the small fontanelle coming to the pubis, three-quarters of half a circle being traversed by the occiput. Labor is now the same as in O. L. A. External restitution is more common and more marked.

Why does not the occiput rotate into the hollow of the sacrum, being so near it? It does sometimes, under pathologic conditions, especially in large pelves, or with very small babies. In normal cases this abnormal rotation is prevented by incurvation of the spines of the ischia, the pyriformis and finally by the shape of the pelvic floor. In 3 cases out of 100 the posterior rotation occurs. The back of the fetus tends to come to the front, and it brings the occiput with it. Another factor favoring anterior rotation is the fact that the shoulder of the fetus strikes the promontory of the sacrum and a rotation of the head backward would be communicated to the shoulder, but is thus prevented. Sutugin says that the back is to the side always, which would favor anterior rotation of the head in this way. After anterior rotation has gotten the head into the transverse diameter the mechanism is the same as that of O. L. A.

Findings.

Abdominally, the back is felt posteriorly and to the right. The heart tones more in the flank half way to the navel. During labor both gradually come anteriorly, sinking at the same time. The shoulder is on the right side of the median line, and turns to the front, then to the left side of the center, as labor progresses. The forehead at first is plainly felt above the left ramus of the pubis. It rises a little higher, due to flexion of the head, then it sinks lower, advancing, finally it sweeps around the left half of the pelvis, disappearing at the side. *Internally* at the beginning of labor, head

high up, sagittal suture in *right* oblique, large fontanelle left anteriorly, small fontanelle high up and to the right sacro-iliac joint. Flexion is less marked in these cases. After descent started, the flexion of the head throws the small fontanelle nearer the finger, the large fontanelle recedes and sagittal suture becomes more vertical. Should flexion remain out, the head reaches the perineum, the small and large fontanelles descend in nearly the same plane, the sagittal suture running more or less transversely. After rotation is completed, the findings the same as O. L. A.

Labor is always longer, harder, effacement and dilation of the cervix not so complete, and more painful in occiput posterior positions. The occiput has to rotate through an arc of almost 140 degrees, three-quarters of half circle, whereas in O. L. A. it has about 45 degrees to traverse, one-quarter of half circle. The spontaneous completion of labor depends, therefore, on powerful uterine contractions aided strongly by the abdominal muscles. In a long labor both are likely to be exhausted and so we often see cases of relative insufficiency of the powers of labor in O. D. P. In these cases labor comes to a standstill, the sagittal suture usually in the transverse diameter, or part of the anterior rotation completed but the small fontanelle not all the way around.

The points to remember in occiput posterior positions are: 1st. Descent and flexion are slower than in occipito-anterior positions. 2nd. If the spine of the ischium is well developed, the anterior lateral inclined plane is well marked and will direct the occiput anteriorly. 3rd. The shoulder impinging on the promontory of the sacrum tends to prevent the posterior rotation of the head. 4th. That anterior rotation may not occur until the head is well on the pelvic floor. 5th. That labor is much longer and slower than in occipito-anterior positions, dilation of the cervix is slow. 6th. That occipito-posterior position is eutocia usually.

Changes in the Fetal Head.

The caput succedaneum was already described. It is always found on the more dependent side of the head. This is almost always the anterior side of the head. In O. L. A., therefore, the right parietal bone, and since the occiput presents, the posterior part of the bone shows the caput succedaneum. In O. D. P. positions the caput succedaneum is situated on the left parietal bone. We can thus diagnose the position which the fetus held in utero after it is born. In addition to the edema, and exudation of the caput succedaneum, there are almost always some small hemorrhages in the skin. These remain long after exudation is absorbed and show the site of the caput succedaneum.

The head during labor, especially if it passes through a tight pelvis, undergoes a very *slight diminution in size.* This is due pos-

sibly to an escape of the cerebro-spinal fluid from the head into the spinal canal. It is certainly not due to compression of the cerebral contents, since the contents of the skull answer the same physical laws as fluids, i. e., are incompressible.

The shape of the head is much altered. Since the chin is strongly flexed on the chest, it follows that the head is flattened from the large fontanelle toward the nape of the neck. The sagittal diameters of the head, therefore, may be increased. The sub-occipito-bregmatic diameter is decreased, occipito-mental and occipito-frontal are increased in length. The result of the compression, which the head undergoes all around, causes the forehead to be flattened out and the occiput to project in the form of a point. The bi-parietal diameter is also decreased. The head offers thus a longer, narrower cylinder to the birth canal. These changes in shape of the head are possible by means of the elasticity of the bones, and the loose connections they have with each other, at the sutures.

In cases where the head meets with an ordinary amount of resistance the bones overlap at the sutures. The occipital bone is generally displaced under the two parietal bones, the frontal is usually below the level of the parietal bones, and one parietal bone is over the other. If the left parietal bone was posterior it is pressed in by the promontory of the sacrum, and lies under the right, and conversely. Therefore, in O. L. A. the right overlaps the left, in O. D. P. the left overlaps the right. This is especially marked in contracted pelves where the head is arrested for a long time at the inlet with the posterior parietal bone resting on the promontory.

Along the sutures it is not uncommon to find numerous small hemorrhages. Some may be the size of a thumb nail. Occur in normal and pathological cases (beautiful specimen in the museum) There is another change in the shape of the head, due partly to the pressure of the promontory, but more often to the pressure of the pelvic floor against the posterior parietal bone. It is an *asymmetry of the head when viewed from behind.*

In contracted pelves where the head is forced powerfully against the promontory of the sacrum, the posterior parietal bone is forcibly pressed in and the asymmetry is marked. In other cases where the flattening of the parietal bone is due to the pelvic floor, it is not so marked. In O. L. A. it is the left parietal bone which is flattened, the right, which is convex. In O. D. P. the reverse.

Finally, we observe an *asymmetry of the head* not due to the mechanism of labor, but to a congenital scoliosis of the spinal column. All forms of growth have a slightly spiral direction. True also of the fetus. The right parietal bone seems to be pushed in a horizontal plane, anteriorly. The left parietal bone is therefore more convex, the right appears flat. The cranium is, as it were, twisted in a horizontal plane from left to right. This obliquity persists and

can be found in the adult. Called the asymmetry of Stadtfeld, who first described it. During labor in O. L. A. the twist is counteracted by the flattening induced by the mechanism or even twisted in the opposite direction from left to right. The alteration in shape that is induced by labor lasts only 3 to 6 days when it is gone and the real asymmetry now may be seen. In cases of O. D. P. the two factors combine to produce a marked flattening of the head. This becomes less marked later. Breech cases in primiparæ sometimes present marked deformity of the head.

Mechanism of the Separation of the Placenta.

After the expulsion of the child the uterus rests. This period lasts from 5 to 30 minutes, then the activity of the uterus begins again. During this time the muscle is in a state of *retraction*, the fibres and lamellæ are superimposed on each other, rearranged. There is no hemorrhage from the mouths of the vessels of the placental site because the superimposition of the lamellæ mechanically closes off the blood vessels and, second, thrombosis occurs in their open ends. Of these the second has a relatively unimportant part, and more in pathologic cases.

By this retraction of the muscular fibres, the placenta is mechanically separated from the uterine wall, since the area of its insertion is diminished. This action, of course, is aided by the uterine contractions.

2nd Factor. A small hemorrhage forms behind the placenta. The placenta is more firmly adherent at the edges than in the center, at the rim of the closing plate of Winckler. The hemorrhage, therefore, will lift the placenta up in the center. The next pain will force the blood clot between the placenta and the uterine wall, separating it in the smoothest and most perfect manner. This blood clot is the retro-placental hematoma. Sometimes when brisk manipulation is made on the uterus, the edge of the placenta will loosen from the uterine wall and the blood make its escape externally. Under these circumstances we will have an atypical mechanism of the third stage.

3rd Factor. Is the sudden diminution of intrauterine tension.

During labor the placenta was forced in contact with the uterine wall by the increase in the intrauterine pressure. After this is gone there is nothing to prevent the placenta falling into the cavity of the uterus.

4th Factor. In some cases where the cord is less than 35 cm. long it must be drawn on to a more or less extent. Separation occurs in the ampullary layer of the decidua, i. e., at the expense of the mother. After the placenta is loosened from the wall of the uterus it drops down against the cervix, drawing the membranes after it.

Expulsion of the Placenta.

This is brought about by the uterine contractions, they force the loosened placenta against the internal os, and finally through it into the dilated cervix and upper part of the vagina. During this process it proceeds in one of two ways.

1. It turns partly inside out like an umbrella. The fetal surface comes out of the uterus first, the cord leading the way, the membranes containing the retro-placental hematoma following. This is called *Schultze's method.*

2. The lower edge of the placenta proceeds first, the whole organ sliding down the side of the uterus into the vagina. In these cases the retro-placental blood clot is small, and the edge of the placenta may have been torn off the uterus early allowing the blood to escape. This is called *Duncan's method.* The first is the most common according to some authors, the latter according to others. The placenta often comes out in a manner combining both. In the author's experience a pure Duncan's method is rarely observed. The uterine contractions are aided by gravity; this is of greater value when the patient is standing or crouching, and is used mostly by savage tribes.

Finally the abdominal muscles play an important part in the expulsion of the after-birth. The uterus alone is not able to expel the placenta out of the vagina. The patient bears down and forces the placenta out of the vagina and lower uterine segment, or the physician presses it out.

The Separation of the Membranes.

These are drawn mechanically after the placenta from off the wall of the uterus. The uterus being in a state of firm contraction, can assist this peeling off considerably. They are also occasionally separated in part by the retro-placental hematoma and sometimes the separation caused by the blood clot may be quite extensive, but this borders on the pathologic. After the placenta is outside the vulva, the membranes follow slowly to gentle traction. If they are slightly adherent, the uterus follows the traction and the anterior lip of the cervix may be seen in the vulva. The hemorrhage comes from the maternal sinuses. In normal deliveries no blood comes from the placenta itself. This may be demonstrated on the placenta by injecting the vein with milk, no milk appears on the surface of the placenta. The decidua reflexa is generally attached to the outside of the chorion and parts of the decidua vera are torn off the uterine wall. Sometimes the decidua vera may remain in the uterus completely. It may then be seen as a yellowish gray layer covering the mucosa. (Again in physiology of the Puerperium.)

In cases where the amnion covers the head as a caul, separation

between the amnion and chorion occurs and the amnion is found folded around the cord, attached to the placenta simply at its base. The chorion is now stripped off the uterine walls by the placenta and is extruded with the decidua. In pathologic cases or where too brisk massage is used the chorion may rupture at the edge of the placenta and may tear to a more or less extent, remaining in part or in toto in the uterus. In these cases the two deciduae remain also, and all three have to be expelled in the puerperium.

After the placenta is extruded, the uterus contracts down to a hard pear-shaped body in the inlet of the pelvis. The fundus reaches two fingers below the navel. The uterus at first is pear-shaped, and in the top either before or behind, can be felt a flat dimple. This is the spot where the placenta was formerly situated and may be used to determine the location of the placenta. Schroeder found this in almost all of his cases. After a few after pains the uterus loses its sharp contour, becomes more globular and rises to the navel, due perhaps to a clot, and rearrangement of the muscle fibres. Unless displaced by the full bladder, the uterus lies directly against the abdominal wall, where is may be felt as an alternately contracting and relaxing ball. In this stage there is a little bloody flow from the uterus, but not over 2 oz. in two hours. The walls of the uterus are very thick, 6 to 8 times thicker than when the ovum was in it, the anterior and posterior walls are applied to each other, unless there is a clot in the uterus. At the placental site the wall of the uterus is much thinner than elsewhere in the fundus, and very rough, also slightly raised above the level of the rest of the uterine mucosa. In the lower uterine segment the wall is very thin and the rearrangement here is slower, and it therefore acquires its original thickness later. In some cases where the lower uterine segment has been thinned too much in a pathologic labor, it may be so thin and soft that it is not palpable but the fingers touch the internal os first. The fundus is folded down on the lower uterine segment and vaginal portion of the cervix. It is not rare to find a clot in the lower uterine segment projecting into the vagina. The *puerperium* begins after the expulsion of the after-birth. (See Puerperium later.)

THE CONDUCT OF LABOR.

It is of great advantage to know your patient beforehand and have made all arrangements with her, have examined her carefully, especially the pelvis, have seen and instructed the nurse. You must know exactly what you want, must have decided opinions on every point and enforce them. There still remains a certain amount of superstition about obstetrics and the management of the woman and babe which you may have to contend with. Nurses also have various habits that are grounded in a more or less valuable experience. Often you will be asked, "How do *you* treat the breasts?"

"Do you use the binder?" "The belly band?" etc. It is well to have all these points settled before the labor, and since, as young physicians, you will get primiparae principally (the multiparae having a leaning toward the doctor who confined them before), you meet with little resistance.

Try to be in town when the case occurs and be sure to notify your patient if you are called away, and let her know for whom she should send in such emergencies. In case you are called when the doctor of the patient is temporarily absent, hand over the case to him when he appears. Do nothing to hurry the labor, that it may be completed before he comes. Go to a case of labor as soon as you are called. Almost always you are called hours too soon, but arrived on the scene you may correct a mal-presentation, or prevent some puerperal accident; further, the patient is often nervous and wants to know if everything is right. You may also leave instructions about the preparation of things if the patient happens not to have a trained nurse especially *bowels* and *bladder*. Arrived at the case, you determine five things:

I. Is the patient pregnant? II. Is she in labor? III. At term? IV. Parity. V. Presentation and position, or *Diagnosis of the case.*

The signs of pregnancy are easy to determine but errors have been made. The diagnosis of labor is more difficult. The two signs:

1. The regularly recurring *painful uterine* contractions.
2. The effacement and dilatation of the cervix.

The pains that the multiparae have in the last weeks of pregnancy may be confused with the pains of labor. Most of these pains are due to colicky movements of the bowels, but some are due to painful uterine contractions and may be distinguished, 1st, by their regularity; 2nd, the uterus does not take the shape we have already mentioned; 3rd, they occur especially at night and disappear in the morning; 4th, they are abdominal and not in the back, as is usual in ordinary labor pains; 5th (important), there is no "show." Treatment, full warm bath and warm enema, or castor oil.

3rd Question. Is she at term? Except in pathological cases the size of the abdomen generally gives sufficient information together with the statement of the patient, as the date of last menses.

4th Question. How many children? May be denied. A careful examination with this point in view may be necessary in legal cases.

5th. The diagnosis of the case. This is most important.

Do not enter the room abruptly. Let the patient know you have come. Be alert to any sound from the lying-in chamber; you may be able to tell from it whether the patient is in the first or second stage, and whether you should hurry or not. Unless necessary do not go about the examination immediately, but watch the character of the pains and their frequency. Place the hand on the abdomen, can feel the uterus even through the clothes.

Method of Washing Hands for Obstetrical Cases.

General Rules:

(1) Keep the hands aseptic by avoiding direct contact with infective matter.

(2) After all dissections, dressing pus cases or erysipelas cases, or touching the lochia of puerperal cases, sterilize the hands.

(3) After attending diphtheria or scarlet fever cases, etc., change of clothing, bath, shampoo head and beard.

Rules for Sterilizing Hands.

(1) Coat off, sleeves above the elbow for all cases.

(2) Wash street dirt off with water and much soap.

(3) Scrub in running water or frequent changes for four or five minutes. Rinse and dry.

(4) Now pare and clean the finger nails carefully.

(5) Wash for a minute in hot water; dry the hands and make the external examination. After this:

(6) Get two (2) solutions ready, near the bed: I. 1:1000 $HgCl^2$. II. 1:1000 $HgCl^2$ or 1% Lysol.

(7) Now scrub for five (5) minutes in hot running water, paying attention to the creases and under the finger nails.

(8) Wash the vulva with solution No. 1, leaving a bit of soaked cotton in the vulva.

(9) Now scrub in the solution No. 2 for a full minute and carry the two first fingers still wet with the solution directly into the vulva, being sure that they touch nothing on the way.

After having to do with septic cases double the time of each procedure, and wash the hands with 95% alcohol just before point nine and use sterilized rubber gloves.

Use sterilized rubber gloves for all cases of labor. Carry two or three pairs in the obstetric satchel.

Few Words about the Preparation of the Patient.

She should take a general warm soap and water, shower bath, paying particular attention to the genitals. The hair should be closely clipped, but no need to shave the vulva, save for operations and in hospitals. Then the patient should have enema of soap suds; after this has acted, local wash and then with Hg Cl^2, 1/2000, using this freely about the hips. She should have a long night dress and skirt, over all a woolen wrapper. This is for first stage. In the second stage she is in bed and wears a short night dress of the smoking jacket pattern. During the labor the nurse applies a sterilized pad to the vulva, supporting it by pinning it to the under gar-

ment. This is to catch the mucus and blood which may be discharged. The necessity for examination is generally understood, and the nurse prepares the patient for the same. Patient lies at the side of the bed covered with a thin blanket or counterpane. The physician prepares his hands as has been described (soap and water, brush, nails cleaned, rinse in hot water, dry on clean towel), and makes the external examination.

Cover drawn down to the pubic hair; do not uncover this. The chemise is drawn up to the ribs. It is better to expose the skin, done in a gentlemanly manner it gives no offense. Size of the uterine tumor noted, fundus, see if a furrow, then the four points of diagnosis of position—ovoid? over inlet? in fundus? where is the back? There are a few other points in the diagnosis of presentation and position especially emphasized by Leopold, although the methods have been known for years.

1. *To distinguish the occiput from the sinciput.* Two ways.

A. *Two hands.* Press down toward the linea innominata and get the head between them, where the occiput lies the hand will sink deeper. 2nd. It will feel a relatively flatly rounded body. 3rd. This is relatively nearer the median line. Where the forehead lies, the hand will not sink as deeply. 2nd. Will feel an angular body high up. 3rd. It will be further from the median line.

B. *One hand*, fingers and thumb separated to the utmost, is placed palm down just over the pubis and grasps the head between them. The same signs will be noted.

When the head is low in the pelvis, latter method not serviceable; have recourse to the first, but this is somewhat painful, especially toward the end of labor.

2. *To palpate the shoulder.* Sink the hand just above the head and you will generally feel the groove which the head makes with the neck, now pulling upward with the hand it comes to rest on the shoulder.

3. *To palpate the breech,* similar procedure, sometimes possible to outline the breech, feel the genital crease, and inguinal fold, the feet and even the toes in favorable cases. The breech may give important information as to the location of the back, e. g., if you feel the breech with the heels in front of it, you may say the back is directed behind, thus: If the breech is toward the front and the heels behind, the back lies in front. Favorable in some cases where you cannot feel the back. The position of the head corresponds closely with that of the breech. (De Lee's Sign.)

4. The placenta under exceptional circumstances may be felt. This is when it is in the lower uterine segment. A boggy sensation here and loss of the sharpness of the parts underneath. Especially if there is some hemorrhage in the first stage, one thinks of low

insertion. Further, if the presenting part be still high up, all three make a low insertion probable. Occasionally a circular groove may be seen through the thin abdominal wall. No auscultatory signs can be relied upon. The heart tones are sometimes covered by the placenta.

5. Feel the round ligaments on either side, more easily on the left, note their tension and if they are tender to the touch, also note their direction. If the round ligaments run on the anterior surface of the uterus the placenta lies on the posterior wall, whereas if they run more to the side or even posteriorly the placenta is situated anteriorly. Leopold, Bayer, etc.

6. Note any *tumors* in the uterine wall, especially fibroids. The *cord* has been felt coursing over the back of the fetus. Locate *fetal movements* such as those of the extremities or hiccough, or *respiratory movements*.

7. Note the character, severity and length of the uterine contractions, this being necessary in determining the progress of labor.

8. Determine the engagement of the presenting part. This is done by means of the two maneuvers used in determining the location of the occiput. The head grasped between the hands or between the thumb and fingers is moved from side to side to determine its movability. Can also feel how far the head has sunk into the pelvis. This is most important part of the examination and should never be neglected, i. e., "Is the part engaged?"

9. Auscultation. Make your diagnosis of presentation and position first, and then confirm it by means of the heart tones. In the beginning of labor they are high up and to the left half way to Poupart's ligament. Later they come lower and anteriorly, while when the head bulges the perineum they are just above the symphysis. Thus you may use them to determine the course of the labor. Should be 120 to 140. Any permanent increase above 160 and decrease below 100 or to 80 means danger to the fetus. Notice especially any irregularity. A careful observer can notice a weakening of the first sound, which is an early sign of fetal danger (i. e., asphyxia). May not be heard even when present, e. g., covered by placenta, hydramnion. In 11% of cases can hear the funic souffle. Remember, its position over the neck generally means that the cord is around the neck. In cases where the cord runs over the back one may compress it between the stethoscope and the back, producing a murmur. These cases are very rare.

10. *Measure the pelvis unless already done.*

The main points of the first examination are:

1. Accurate diagnosis of presentation and position (ovoid? over inlet? in fundus? where is back?).
2. Engagement.
3. Determination of life of the fetus.

4. Character of the uterine contraction.
5. Pelvic measurements.

The value of the external examination is that we can get the information quicker, earlier, less painfully, and with no detriment to the patient. A large number of labors can be conducted successfully without any internal examinations and as your experience grows you will be able to do this. Still, expediency prevents it for exclusive practice. If you have the time, if the presentation and position are good, if the heart tones are normal, you need not make an internal examination. Almost always, however, this is made because we need all the information we can get, we want to complete the pelvic measurements and see if we may leave the case to attend to something else.

The nurse is told to prepare the patient for internal examination or you do it yourself. The hands are therefore scrubbed again and disinfected according to the formula, and the two first fingers passed into the vagina. Pass them all the way in at the start, as they are clean, later they become soiled by contact with the skin, hair, etc. Describe method of making internal examination. Note *first* the cervix—whether it is effaced, whether the os externum is patulous, whether you can reach the internal os, if the canal is effaced and commenced to dilate, how far the dilation has progressed. A good method of description is that of the fingers—say that the os admits 1, 2, 3, or 4 fingers. Another method often used is to say the os is the size of a ten-cent piece or quarter or half dollar, and palm of the hand.

A marked difference exists between the primiparae and multiparae with reference to the effacement of the cervix and dilatation of the external os. In multiparae the upper part of the cervix is dilated and the external os gives way quickly. In primiparae, however, the cervix is slowly effaced and dilated from above downward and the external os must be dilated by the pains aided by the bag of waters. In the beginning of labor in primiparae the finger passes along the cervical canal for the length of one phalanx and may not pass through the internal os. As labor goes on the cervix shortens, the internal os dilates. The cervix shortens till only the external os remains, it has a thick edge, and is thus described.

The bag of waters may be felt through the cervix. The cervix is taken up more into the uterus, it is effaced, the edge of the cervix becomes thin and gradually the os dilates. When the external os is flush with the vagina we say that dilatation is complete. In a multipara the process is quicker, as soon as the cervix is effaced the external os, being already partially dilated, expands rapidly. Even at the beginning of labor, one or two fingers may be passed through the internal os, especially if there have been forceps or other operative deliveries, causing laceration of the cervix. In certain cases you

come to a labor and find that even though the pains have been very slight, effacement of the cervix is complete and dilatation of the os commenced, or at an operation undertaken to terminate pregnancy, you find things as described. This is called *Insensible Labor* by the French. It happens in cases of eclampsia frequently, and in hydramnion, and is usually heartily welcome. Find it occasionally in latter weeks of pregnancy.

II. The *second* point to determine is whether the bag of waters has ruptured or not; usually easy but may be hard. Feel a tense, smooth membrane over the head, a little pressure and you can touch the head through it. This is during a pain (careful not to rupture the bag of waters), when relaxed the membrane feels smooth, while if already ruptured you feel the head with the hair on it, and the bones are felt more distinctly. It takes some practice. If in doubt, examine during a pain, if still doubtful pass the finger inside the cervix, pushing up the head; liquor amnii will now flow into the hand (Charpentier). Remember that there may apparently be two bags of waters, which may be due to (1) twins, (2) rupture of the membrane high up, (3) the separation of the amnion and chorion and the accumulation of fluid between the two. This fluid comes from relics of allantois.

III. The *third* point to determine is the presence of the head in the pelvis. A hard, evenly round body is the head, but mistakes have occurred, e. g., breech. If the os be dilated you may feel the sutures through the membranes. If not, it is very hard to feel the sutures. May be impossible.

In the middle of the pelvis, high up, you feel the sagittal suture. May be nearer the promontory of the sacrum. "Naegele's obliquity." Following it along you feel the small fontanelle to one side, the large on the other. Differentiate them by the number of sutures running to each. Three sutures go to the small, four to the large fontanelle. The obtuse angle of the large fontanelle points to the occiput. The sagittal suture lies in a relatively flat plane of the head. The lambdoid and coronal lie in strongly curved planes, this serving to distinguish them. The lateral fontanelles are distinguished from the others by having the ear nearby. These points enable the position of the head to be accurately determined.

IV. Now determine *how far the head has advanced in the pelvis.*

1. When still movable at the inlet, *caput ballitabile.*
2. When fixed in the inlet, *caput mobile.*
3. When past the inlet, "engaged," *caput ponderosum.*

The head is engaged when the greatest diameter has passed the inlet. In occipital presentation this is the bi-parietal plane, and this is shown clinically, 1st, by the lowest part of the head having reached the bi-ischiatic line, or passed it; 2nd, by the covering of the sacrum, two-thirds; 3rd, by the covering of the symphysis, three-fourths.

The two latter criteria are not as good as the first. Always be sure that the head is or is not engaged before operating. The head is deep in the pelvis when the lowest part is on a level with the tuberosities of the ischia. The head is at the outlet when the biparietal protuberances are passing the tuberosities. It is hard to pass the fingers between the head and the bone. The head is on the perineum when the parietal bosses have passed the tuberosities and the head comes to lie in the distended vagina and vulva. The forehead is just passing the end of the sacrum.

In the progress of labor the head comes down to the pelvic floor and is met by the finger immediately after passing the vulva.

V. *Examine the pelvis.* Run fingers over the walls of the pelvis, determine the presence of tumors, the general size of the cavity, the ischiatic spines, how they project into the pelvis, palpate the sacrum, note its concavity or convexity, and then posterior surface of the symphysis, perhaps there is an exostosis here. Now take the Conjugata Diagonalis. Sink the elbow well and press the perineum well in with the two fingers outside, the two fingers inside are carried up till they feel the promontory. Here, they are held and the base of the index is pressed up against the ligamentum arcuatum. Th index of the other hand, palmar surface to pubis, now marks the point of the ligamentum arcuatum on the finger. In taking out the finger note the condition of the perineum and the pelvic floor. whether torn, rigid, relaxed, etc.

During the examination note also the roominess of the vagina, the presence of fetal parts in the cervix, the cord or any abnormality which we will learn of in the course of the lectures. To sum up, we determine by the *internal examination*, in exact order;

1. The degree of effacement and dilatation of the cervix.
2. The rupture of the bag of waters.
3. The position of the head in the pelvis; confirm the external examination.
4. The advancement of the head in the pelvis.
5. Examination of the pelvis, bony and soft.
6. Abnormalities.

In every examination determine these points and in the order named. Go very slowly, so that the patient be not hurt, and gently; can almost always get the required information. Do not examine during a pain in order to preserve the bag of waters, but it is justifiable to pass the finger gently around the cervix during a pain so as to feel the bag of waters, its size, and how much the cervix is dilated, also to determine the tenseness of the membrane and, therefore, the strength of the pain. Otherwise, let the fingers rest at the side of the pelvis till the pain has passed away.

After the examination you will be asked two questions. One is certain, "is everything right?" Tell the woman that everything is

right, that the baby lies in good position. If there is some anomaly do not tell her, unless there is some operation to be done immediately and you must use great tact not to frighten her. It is well to tell the husband and then, after a second examination, or after watching the case may inform the mother that something must be done. The second question is, "How long will it last?" Be very careful how you answer this. The clock will almost always contradict you, and then the patient will lose faith in you.

During the first stage the treatment is one of *Watchful Expectancy*. Duty of the physician is to observe, not to aid, nature, till she has proven herself unable to complete the labor. When nature fails, art is to step in. Nothing so reprehensible as meddlesome mid-wifery. Let the woman walk around, sitting down occasionally. She should not go to bed unless tired or as the end of the first stage nears. Pay attention to the bladder every four hours. Diet generally refused, but she should be pressed to take a little light soup, coffee with milk, custard, lemonade, milk shake, cold milk or water.

The nurse changes the napkin occasionally. *Do not let the woman bear down* in this stage; it does no good, does very little, if anything, to hasten labor, and it tires the woman so that when the second stage comes, no strength left. In an occipito-posterior position let patient lie on the side for an hour or two, then continue to walk around. She should lie on that side to which the occiput points. Patient may suffer with nausea, can do nothing for it. Said that "sick labors are easy." Idea that nausea produces relaxation of the cervix, therefore easier dilatation. Former practice to administer emetics for this purpose has its source here. The first stage lasts about 12 to 16 hours in a primiparae. It is not necessary to stay in the house.

If the cervix is not effaced or the os just beginning to dilate, leave, make a few calls, return. Do not touch anything dirty on the way. Return in two hours. An external examination may now give you information as to whether you need stay or not. Do not make more than two examinations in a normal labor case. If the cervix has reached the size of three fingers, not best to leave; certainly not if patient is a multipara. In neither case go to too great a distance, and leave a list of the places you are going to, with the nurse or husband. With a multipara, especially after the cervix is dilating, better to be around. The character of the pains is a useful criterion, also the character of the previous labors.

Put the woman to bed when you judge the first stage is about ended, to wait the rupture of the bag of waters. After this is broken make an examination to see if the cord or one of the members has prolapsed. Determine the other points of the internal examination at the same time. Sometimes happens, almost always in multiparae, that when the bag of waters ruptures, you have to hasten if you

wish to get your hands clean in time. The woman may now be allowed to bear down, may be encouraged to brace the feet, close the glottis and press hard. Use a sheet tied to the foot of the bed, to pull on, or use a skipping rope, or let her pull on her husband. You may take his place occasionally to see how much she really pulls. The patient does not cry so much now, because she feels that there is progress in labor. If, however, it be a long, lingering labor do not let the patient over-do her strength. She must conserve it as much as possible, as she will need it for the second stage. See that the bladder is emptied and avoid a frequent cause of dystocia. A tumor is formed by the bladder over the pubis, soft, fluctuating and separated from the uterus by a groove. Important finding. The bowel must also be emptied by enemata, if necessary.

Anesthesia in Labor.

In November, 1847, Sir J. Y. Simpson first employed chloroform to alleviate the pain of labor. Ether had been employed by him since January of the same year. Since then the use of ChCl3 has become generalized. It met with great opposition at first. But after the Queen of England, in 1853 and 1857, had been chloroformed at each of her labors, the ChCl3, of the Queen, found a permanent place in England. In America and on the continent still, the question is not fully decided. There are those who deny that it is possible to produce insensibility to pain without the loss of consciousness, and say that anesthesia to the extent of doing so is dangerous. Others claim that almost complete absence of pain may be produced, and still the patient be awake and alive to the surroundings. We notice here two kinds of anesthesia spoken of:

1. That pushed to a degree to dull the pain, but which allows consciousness to be retained. *Obstetric degree.*

2. That where anesthesia and absence of reflex action are produced. *Surgical degree.*

These two conditions must be kept well apart. In normal labor the majority of women do without anesthetics. Great variety in the ability to bear pain. Higher bred the woman, less amount of pain she can bear. Some women even suffering much will refuse anesthetics. Others, having before had them or heard of them, will cry for their use, perhaps at the beginning of labor. Of those known, chloroform and ether are used. Each has its adherents. In general surgery, chloroform is said to be more dangerous than ether. Point not certainly proven, since numerous deaths after the narcosis has passed away may be referred to the ether. In obstetric practice, chloroform is most used. It is less pleasanter to take, easier to carry, more prompt in action, less required and there is seldom any vomiting after. It is not any more dangerous than ether. Very few deaths have occurred under its use but this means obstetric

anesthesia. We have proof that when the anesthesia is pushed to the surgical degree that the obstetric patient enjoys some slight immunity from the dangers of ChCl3.

The number of anesthesias is enormous, but the deaths exceedingly few. This comparative immunity should not invite carelessness in the use of the agents. Objections to ChCl3 are: 1st. Said to weaken uterine contraction and retraction and, therefore, retard labor and cause relaxation of the uterus in the third stage, and hemorrhage. 2nd. The danger of death. 3rd. That it affects the fetus. A silly argument is that the woman will not love her offspring as much. Ether has the same objections as ChCl3, but it is said it does not weaken the pains as much. Objections to anesthetics in general are those of ChCl3. There is no doubt that ChCl3 weakens the uterine contractions to a certain degree. Early in labor this is of great importance. Later, when the pains are good, strong and frequent, the effect is small. Sometimes ChCl3 may regulate the pains, by relieving the patient of the pain, which makes her less willing to bear down, the expulsive efforts are increased. Further, if the cervix be irritable and resisting, the anesthetic may, by calming the pains and relieving the spasm, actually facilitate labor. It is still too early to pass judgment on the new form of regional anesthesia invented by Corning, and elaborated by Bier and Tuffier,—the cocainization of the spinal cord. The injection of 1/6th grain of cocain into the spinal canal destroys sensibility below the diaphragm. Various European clinicians have employed the procedure in labor and in this country, particularly Marx, of New York.

It is wisest to wait till further experience in general surgery indicates the propriety of adopting the practice for obstetrics. My personal experience with ChCl3 is so satisfactory that I feel some inertia when it comes to taking the trouble to prove the innocuousness of another.

Chloral and morphia are often used during labor to meet special indications.

Indications for administering ChCl3 to the obstetric degree:

1. *Great Pain* at any stage, especially at end of first and in the second stage.
2. *Great Excitability* of the patient at the end of the first or in the second stage.
3. *Tumultuous pains*, at the same time there being some rigidity of the cervix, at any period of labor. Think of rupture of the uterus.
4. *To protect perineum*, to prevent too forcible bearing down.

Conditions.

1. Labor must be sufficiently advanced. Very near the end of the first stage, at least.
2. Pains must be strong.

Examination of the patient must have been made. In pathologic presentation, must have special indications for ChCl3, as a rule, not to be used.

Selection of Anesthetic.

If you are going to administer it yourself, or have a Dr. do it, use ChCl3. If the woman herself, as is sometimes the case, or the husband, use ether always. The safety of ChCl3 depends on the one who administers it. In cases of labor I use chloroform exclusively.

Method. Use any inhaler or handkerchief. When the pain just begins pour 2 to 5 drops on the handkerchief and hold over the nose. Keep till the pain begins to pass off. This can be determined with a little experience. At the next pain repeat the process. May be necessary to put more on the cloth, but see that the patient does not inhale too much; often one or two whiffs enough.

Obstetric anesthesia is: 1. Always intermittent. 2. Never complete. 3. Only during the beginning and height of a pain. As the labor ends, give more, and at the end of the second stage, while the head is coming through, the patient may be almost completely under. The mask is then completely removed, and by the time the baby cries the woman begins to waken.

Surgical degree of anesthesia is needed in obstetrics under the same conditions as in surgery, *to abolish reflex action, to quiet patient, to relieve pain.* Remember that the same dangers are present as in ordinary surgical anesthesia and the same rules govern you here as there.

The points of treatment in the first stage are:

1. Antisepsis.
2. Diagnosis of the case.
3. Watchful expectancy.
4. Attention to the bladder and rectum.
5. Relief of pain.

Treatment of the Second Stage.

The patient must await the rupture of the bag of waters on her back. Now make an examination, and you will generally have to stand ready to deliver the child, wherefore keep your hands clean. In primiparae you usually have more time, the second stage lasting 1½ to 2 hours. Still, the bag of waters may rupture only when the head is well down on the perineum and then the head comes rapidly out. Patient may feel as if bowels would move, but *do not* let her get out of bed. Until the head is well down on the perineum keep her on her back, or allow her to turn on her side, that side to which the occiput points, this favoring rotation. Obstetrician's duty here is watchful expectancy also. He must regulate the abdominal pres-

sure. Use the various aids mentioned—pulling on a sheet or the hands of the nurse or husband.

The question of anesthesia again comes up. May not be necessary now, as the patient bears down strongly and does not complain very much, still occasionally needed. Have someone else administer it or wrap a bichloride sponge around the bottle and give it yourself. Two important points in the treatment of the second stage are, the *protection of the perineum*, and the *preservation of the child's life*. Some authors have held that the protection of the perineum is unnecessary, that in normal cases the perineum does not tear, or tears so slightly that no pathologic significance is to be attached to it. These views are wrong. A woman may be made a life-long invalid from so-called normal labor, the perineum may be torn through the anus; further, these tears may almost always be limited and very, very frequently be prevented. We, therefore, protect the perineum.

Reasons are:

1. The perineum is a "structure of physiological and pathological dignity." Extensive rupture of the perineum causes sterility often.

2. When the rupture occurs in the median line, no one can tell where it will end. It may pass through the anus and cause permanent incontinence of feces.

3. They may form atria of infection which may be fatal.

4. Perineal structures once torn cannot be perfectly restored, as they almost always shrink after a longer or shorter period of time.

5. Protection of the perineum is possible; 15% to 20% of primiparae and 5% of multiparae suffer more or less tearing of the perineum; 39% of primiparae have a tear of the fourchette. The hymen is always torn. In some cases, where the elasticity of the perineum is slight, or the head too large, or where the perineum is pathologically altered, e. g., edematous, a white-celled infiltration from syphilis, condylomata lata, or infiltrated with fat, it will almost always tear. These form not more than 15% of cases. Still, in these cases the tear can be limited. Other causes of perineal tear even when the perineum is not pathologically altered are exit of the head in a bad position, e. g., posterior rotation of the occiput, face presentation, brow presentation, breech presentation. Here the necessity for rapid delivery of the head exists, and this is the main reason for the tear. Small angle of the pubic rami. The levator ani may tear from the wall of the pelvis at the side. These are hard to prevent, harder to diagnose and impossible to sew up. An early recognition and median incision in the levator ani are to be made.

Method of Protection.

1. *Place patient on the side.* Always deliver on the side. Schroeder proved that tears are less frequent with this posture. Reasons

are, the patient cannot press so hard and, therefore, the head comes through more slowly. Again, you can control the escape of the head better. Other advantages of the side position are, you can see the perineum and observe the beginning of a tear. You have the patient in your grasp. There is one strong objection—one cannot listen to the fetal heart tones so easily as when the patient is on her back. If there is any suspicion of fetal danger, keep patient on her back.

2. *Retard Descent* till the elasticity of the pelvic floor and perineum is most developed. When the head becomes visible in the vulva, place the fingers near it to see that it does not come down too far at one pain. Sit on the side of the bed with one arm over the abdomen and the hand between the thighs resting on the pubis. If the woman is bearing down too much tell her to stop it, to cry out or to breathe hard with the mouth open. As the head comes down place the finger on it so as to allow it to advance a little further with each pain. Be careful not to injure the head by too firm pressure.

3. *Prevent Extension of the head, i. e.,* let the head come down in forced flexion till the nape of the neck is well against the symphysis and the parietal bosses have been delivered, then allow the forehead, face and chin to come over the perineum, forcing the whole head up on the symphysis as it comes out.

4. *Deliver the Head Between Pains.* Hold the head back with both hands; when the last few pains come on, tell the patient to open her mouth till pain passes off, then ask her to bear down while you push back the rim of the vulva on each side of the head and push up on the head at the point of the large fontanelle. After the parietal bosses are delivered, pull the head up and let the soft parts slip back over the forehead and face by their own elasticity. Wipe the mucus from the mouth and eyes, and wash around the eyes with pledgets wrung dry from the antiseptic solution. This is to remove infection from the neighborhood of the eyes. In passing through the outlet of the pelvis and vulva, it is important that the smallest diameters of the head be presented to the girdle of resistance. To accomplish this, the normal mechanism of labor must be adhered to. When the head comes down to the perineum, the occiput comes up under symphysis. The sinciput may now tend to ascend, *i. e.,* the chin to deflex, before the occiput is well delivered. This occurs in cases, especially where the perineum and vulva are resistant. If the head were allowed to come out in this way the largest diameters would be presented to the girdle of resistance, *i. e.,* the occipito-bregmatic, occipito-frontal, occipito-mental. The perineum would almost surely tear.

If this extension is prevented and the head brought down so that the occiput comes out, the nape of the neck presses well up against the pubic arch, *i. e.,* flexion is kept up, the nape forms the center,

and the suboccipital diameters are offered to the girdle of resistance, *i. e.*, suboccipito-bregmatic, suboccipito-frontal, suboccipito-mental. The gain from flexion varies from 1½ to 3 cm. in the various circumferences presented.

Points in the protection of the perineum are:

1. Deliver in the side position.
2. Retard descent till elasticity of perineum developed.
3. Deliver the head in forced flexion.
4. Deliver between pains.

Latterly it has been recommended to put the patient in Walcher's position during the delivery, it being claimed that this prevents perineal tears. Theoretically, it is difficult to see how this position can accomplish the stated result, because it diminishes the bony outlet, and particularly are the pubic rami brought closer together, which forces the head back against the soft parts. The few times the writer has employed the method, progress in delivery has been distinctly interfered with. The method is very awkward to the accoucheur and painfully uncomfortable to the patient.

In 85% of the cases the perineum can be saved from rupture, but where the disproportion between the head and the vulvar outlet is great, or where the vulva is pathologically altered, a tear may be unavoidable. To obviate these tears an operation called *Episiotomy* is sometimes done. This is an incision usually made at the side of the vulva about 2 cm. from the raphe, 2 cm. deep, dividing skin, muscle and vaginal outlet; may be uni- or bi-lateral. Or one may cut from the median line down along side of anus. This operation was devised by Ould, in 1742, for cases where the tight perineum offered resistance to the exit of the head. Others since perform it to obviate a central rupture of the perineum. Claimed that a lateral incision is preferable to a tear in the median line, since:

1. Cannot tell where the tear will end; it may involve the sphincter ani.

2. Clean-cut wound; also further from lochial secretion than center tear.

3. Importance of the lateral structures of the vulva not so great as central.

There are certain Objections to Episiotomy:

1. It is usually unnecessary; doing it, one sometimes decides that the head would have come through without it.

2. It may leave painful and deforming scars.

3. The perineum may tear in the median line, even with lateral episiotomy.

Method of election is that of Tarnier; the medio-lateral. Begin at the raphe and cut down alongside anus.

Indications are:

1. Delay in exit of the head, due to resistant vulva.
2. Some indication for *rapid extraction*, by the breech or head.
3. Posterior rotation of the occiput in primiparae, or brow presentation, *i. e.*, when large diameters of head necessarily presented.
4. Some pathological condition of the soft parts, e. g., Syphilis.

In operative deliveries rupture is very frequent and episiotomy often needed. Note when the vagina begins to part. Place one blade of the scissors in the wound, the other blade as indicated in the figure, and cut the perineum.

As your experience grows you will make less and less use of episiotomy, but you had better use it in your first cases, when, in your judgment, there is danger of a deep perineal tear. After the labor the wound is closed with silk-worm gut sutures.

After the head is born pass the finger up over the neck to see if the cord is around it. If it is, draw a short loop, or loosen the cord a little. *Wipe the mucus from the face, mouth and nose.* Use a cotton pledget squeezed dry from an antiseptic solution for the face. Tell the patient to bear down hard, or have the husband press on the fundus uteri, or you may do it yourself with your elbow. There need be no great hurry to deliver the trunk. A few minutes may safely intervene if the face reacts to external stimuli, e. g., blowing on it.

Delivery of the Shoulders.

Usually after a minute, the anterior shoulder is visible, just behind the pubis, the patient bears down, and the posterior shoulder rolls over the perineum. If there should be any delay, turn the patient on her back, which can always be easily done. If the efforts of the woman and pressure on the fundus do not deliver the shoulder speedily, make very gentle traction on the head down toward the perineum till the anterior shoulder is well under the symphysis, the arm stemming behind it. Then change the traction so as to bring the posterior shoulder out, then pull the anterior shoulder from under the pubis. Do this slowly and gently so that you do not tear the perineum or fracture the child's neck or clavicle. A perineum slightly torn by the head may be ploughed deeply by the shoulders. Do not drag the child out of the uterus, let the natural powers force it out if possible. The rest of the child follows in a very few sec-

onds, aided by the expulsive efforts, or slight traction exerted on the trunk.

There is a rush of liquor amnii, and the uterus contracts down to a hard ball, the size of a cocoanut. Turn the patient on her back now, very slowly, keeping a hand on the uterus all the time, and legs close together, to prevent air embolism. See that the baby is not crushed. Place the child just so far that it will not kick the vulva, but near so that it will not draw on the cord. After a few moments the baby cries. At first, if you observe carefully, you will see several light inspiratory efforts, then one or two deep ones, and then comes the cry or sneeze, or a cough, which empties some mucus from the pharynx. The child at first is more or less blue, cyanotic, but after a few respirations, the color gets better. Wipe the mucus from its pharynx with a soft cloth wrapped around the finger, or suck it out with a tracheal catheter. While waiting to tie the cord, wipe the face and forehead with pledgets squeezed dry from the lysol solution. This is to prevent vaginal secretions on the face from obtaining access to the eyes. May now flush the eyes with boric solution poured from a bottle or from a medicine dropper.

The asepsis and antisepsis are carried out with great minuteness during the treatment of the second stage. The woman is placed on her side at the edge of the bed, on sterile sheets, covered with a sterile sheet; she has on sterilized cotton long hose. Between the knees a pillow, pinned in a sterile pillow-case. The vulva and buttocks are washed again thoroughly with 1/1000 bichloride or 1% lysol, and the accoucheur's hands are again sterilized, and they must be kept sterile throughout the entire delivery, which is not always an easy matter. All discharges from the vagina and the rectum, particularly the latter, must be washed off carefully with pledgets of cotton or gauze wrung out of antiseptic solution, taking exceeding care not to wipe anything over or into the genitals. The necessary articles, basin, towels, ligatures, scissors, etc., should be close to the bedside, and means should be provided for the revival of the child and the treatment of the post partum hemorrhage.

The second part, requiring great watchfulness during the second stage, is the life of the child. Every 15 to 20 minutes the fetal heart tones are counted, and other signs of asphyxia studied. See chapter on Asphyxia.

The Cause of the First Respiration.

Subject of great interest. Many theories. One, that of Preyer, that the irritation of the skin from the trauma of labor causes the respiration by stimulating the respiration center reflexly. This is not probable. The child in utero exists in a state of apnea. Stimuli applied in this condition have no effect on the fetus, shown by

rough palpation, attempts at version, forceps, etc. Should the child, however, be partly asphyxiated, the respiratory center will react to these stimuli. The theory that the exposure to cold (when the child is born), causes the respiration, has only an influence of secondary importance. Ahlfeld delivered several children into warm saline solution. The respiration began as usual. Again, sometimes a half minute will elapse before the first respiration occurs, and reflex should be quicker than this. The most accepted theory is that the gradual hypercarbonization of the blood makes the respiratory center more irritable. This occurs in the latter months of pregnancy, due to the gradual narrowing of the ductus arteriosus and venosus. During labor this is increased. When the child's head is born the placenta is beginning to separate, and when the baby is delivered, the placenta is almost completely separated. As a result, the fetus passes from a condition of apnea to one of dyspnea, the respiratory center is irritated and causes respiration. The same condition occurs in utero when the placental circulation is cut off. When the respiratory center is thus more irritable, any external stimulus will have a greater effect.

During pregnancy the blood from the placenta, after being oxygenated, returns to the fetus by the way of the umbilical vein. It enters the liver, dividing into three parts. One enters the liver directly, one meets the stream from the portal and with it enters the liver; the third passes on into the vena cava ascendens through the ductus venosus Arantii. Here the blood from the hepatic veins enters with the stream returning from the legs. This blood is projected into the left auricle and then the ventricle, and is sent throughout the body, the larger part leaving by the way of the hypogastric arteries for the placenta.

The blood from the head ascends in the vena cava descendens directly into the right ventricle. From here it is pumped into the pulmonary artery to the lungs. But these are so poorly developed that they can take little of it. It therefore takes a short cut to the aorta through the ductus arteriosus Botalli and goes down the aorta with the blood from the left ventricle. At no point is the blood arterial. The liver grows faster than the ductus venosus, so that as pregnancy goes on, less and less blood passes through this vein. The lungs develop more as pregnancy goes on and, therefore, use more of the oxygen and the blood which comes from the pulmonary artery. The ductus arteriosus Botalli, therefore, grows smaller. The result of the two factors is that the blood grows more venous in the latter weeks of pregnancy.

After the birth of the child and the cessation of the placental circulation important changes take place. With the first inspiration the lungs expand. The pulmonary vessels are dilated and blood rushes into them from the right ventricle. There is no blood to pass

through the ductus Botalli. It, therefore, contracts, collapses. There is less blood coming from the ascending vena cava (the umbilical vein contracting), the pressure in the right auricle sinks. The result is an aspiration toward the heart of the blood in the vena cava and umbilical vein. The hypogastric arteries contract and thrombose. This is due to the fact that the left ventricle cannot send the blood the long distance through them, since it is no longer assisted by the right ventricle through the ductus Botalli. Also, cold contracts the arteries. The pulsation in the cord ceases.

The circulation is now just the same as in the adult. The ductus Arantii and Botalli get smaller by contraction of their muscular fibres, and the walls are applied to each other. No thrombosis occurs in them or in the vein of the umbilical cord (only in the arteries). They become obliterated in one or two weeks.

An important question is, *when to tie the cord?* Formerly the custom was to tie the cord as soon as the child is born. Now not so. Immediately after the child is born, it is subjected to atmospheric pressure. It is claimed that the pressure in the uterus at this time is somewhat below that of the atmosphere, and that, therefore, the blood of the child may be aspirated into the placenta. There is great doubt about this. We know that during the first minutes after birth the child gains weight, which comes from the blood which it gets from the placenta. This is determined by letting a child lie on a scale, after it is born. Accurate weighings have shown that the fetus of 3,000 grammes has about 158 gms. (Welcker) of blood (1/19 its weight). It may gain 39 grammes of blood.

It is believed by some that the blood is aspirated by the lungs of the fetus. The sudden dilatation of the chest is said to cause decrease in the intra-thoracic pressure and that, therefore, the blood in the venae cavae and umbilical vein rushes to the chest. A certain diminution of the pressure is certain because of the development and unfolding of the pulmonary vessels. But a diminution that would aspirate blood in such a large amount to the child is very improbable; further, at post mortems on young infants, the lungs do not collapse after opening the chest, showing that the intra-thoracic tension is not minus.

It is probable that the pressure to which the placenta is subjected by the uterine contractions forces the blood from the placenta to the fetus. It is claimed for the late tying of the cord that the children lose less weight in the first days and grow better, and are less likely to have sepsis. Argued against the late tying of cord, and especially against the custom of pressing toward the fetus, all the reserve blood in the placenta, that icterus neonatorum, melena neonatorum, even apoplexy are likely to result. We, therefore, in tying the cord take a middle position and wait a few minutes till the pulsation of the cord has ceased, or at least weakened, before

placing the ligature. Tie the cord tightly about one-fourth inch from the navel with sterilized tape. Take a few minutes to do it, so that the jelly of Wharton can be completely pressed away, and the vessels surely compressed. Then tie an inch or two toward the maternal side and cut between the ligatures, one-fourth inch from the first, the cord lying in the hand. See that no part of the fetus is cut or tied during the operation.

The practice of tying the cord close to the skin is only recent. It has the advantages. 1st, leaves a small stump, less to become infected; 2nd, it is easier for the nurse to dress, and is less liable to be pulled upon when the infant is handled; 3rd, the cord drops off earlier, usually by the fourth day, often on the third, which is two to four days earlier than with other methods. This precaution must be insisted on, a careful inspection must prove that there is no hernia into the cord. Use sterilized tape or what is known as "bobbin," impregnated with nitrate of silver; or simply sterilized, and soaked in lysol solution.

The new-born child is more susceptible to infection than the adult. The navel forms the most frequent atrium for the infection, being more or less of an open wound for 3 to 10 days. Arteritis, phlebitis, suppurative hepatitis, sepsis, pyemia and tetanus are all caused by infections of the navel. Therefore, dress the cord carefully. Tie with sterile cord and hands; do not allow the baby to be wrapped in a dirty shawl. Sterilize the stump with 1% lysol, and wrap in dry cotton or sterile gauze or borated gauze. Do not allow the cord to get into a moist condition, but favor mummification, as sepsis less likely to occur when the cord is dry.

The points in the treatment of the second stage are: 1. Asepsis and antisepsis. 2. Anesthetic. 9. Protection of perineum.

The establishment of respiration, the ligation of the cord, the care of the eyes, belong to the treatment of the 3rd stage.

The Care of the Eyes.

Prevention of ophthalmia neonatorum. This is an acute, purulent inflammation of the conjunctiva, due almost always to the Gonococcus of Neisser, and causing frequently total blindness. It is in the highest degree preventable. Even in lying-in hospitals, where a large number of the cases treated suffer with gonorrheal vaginitis, the disease has been eradicated. The germs get into the eyes with the vaginal mucus during the passage of the head through the vagina and set up the inflammation in the conjunctival sac. Other germs may cause the inflammation, e. g., diphtheria bacillus, pneumococcus.

Prevention.

As soon as the head is born, wash face with a sponge wrung dry from lysol or $HgCl_2$; waiting for the tying of the cord, flush

the eyes again with saturated boric solution from a bottle. Separate the lids very gently, or the baby will open the eyes if the liquid is gently poured on the lids, warm from the bottle. As soon as the 3rd stage is over put one minim of a 1% solution of AgNo3 in each eye and then a few drops of salt solution. This is routine in every case.

If you suspect the woman has gonorrhea use the Credè method of treatment of the eyes. One minim of a 2% AgNo3 solution is dropped into each eye, and then neutralized with a weak saline solution. A vaginal douche, 1% lysol, should in such cases be given before labor, and repeated every 8 hours if the labor be long. (Second point in the prevention of ophthalmia neonatorum.) Let the bag of waters rupture as late as possible, so that it covers the vagina as the head comes down. In cases of condylomata of the vulva, or vagina, or where there is a purulent, greenish discharge, or where you have demonstrated the gonococcus, or know the husband has gonorrhea, be on the lookout for ophthalmia. Most hospitals use the Credè method in all cases, as a routine practice. Protargol and argyrol are also used. Pay attention to the first bath, see that no water gets into the eyes, or that the baby does not get its hands to the eyes. In preference to the bath, oil the baby all over with olive oil or albolene, or lard.

After the baby's eyes are attended to and the cord severed, it is handed to the nurse, who wraps it up in a warm "receiver" and puts it near the stove or register. It should not be allowed to become cold.

TREATMENT OF THIRD STAGE.

Treatment of the third stage is highly important, as on it will depend the freedom of the woman from post partum hemorrhage, and also the nature of the puerperium, and even her health later in life. It is equally as important as the second stage.

After the birth of the child have a hand lie on the uterus; it should not rub, but simply lie there. While you attend to the cord the husband or nurse does this. After the baby is attended to, place a warm, clean folded sheet under the patient, draw the cord over one thigh, leaving a short loop, the length of which you note. Place a sterile basin under the buttocks, so as to receive all the discharge from the vulva. Inspect the vulva for tears and note the presence of hemorrhage. If there is none, draw a sheet over the patient, sit down beside the bed, with one hand on the uterus and the other on the pulse. Every two or three minutes raise the sheet and look in the basin to see if blood is accumulating there. Watch patient's color. Hand rests on uterus to determine the degree of retraction and the frequency of the contractions. If the uterus is hard in a normal labor almost always there is no hemorrhage, but if an operative

case, you must watch for external hemorrhage from some injury of the genital tract. No necessity to massage the uterus in a normal case. Two indications for uterine massage: 1st. If there is external hemorrhage. 2nd. If you feel the uterus get soft and balloon out under your hand, rising above the navel. In from 5 to 25 minutes the three signs are present to which your attention is called:

I. The cord becomes limp and advances 3 or 4 inches from the vulva.
II. The uterus rises high in the abdomen, usually to the right side, while below, over the symphysis, it is soft and boggy.
III. The uterus flattens and has a sharp upper border. These mean that the placenta has left the uterine cavity and has slid down into the lower uterine segment and upper part of vagina.

Wait 25 to 45 minutes before expelling the placenta. Often it comes of itself, while you wait, or the woman forces it out. At the end of this time, place the whole hand on the uterus, standing to the side, four fingers behind, thumb in front. First make sure the bladder is empty. *Wait for a contraction.* See that the uterus is in the median line. If the uterus is to the side push it to the median line. If it is not contracted, massage till it gets hard. Now press down toward the inlet of the pelvis, holding the uterus fast. The uterus is used simply as a body through which to exert pressure on the placenta, and this maneuver is called *"early expression,"* early, because it is done before nature would express the placenta. After placenta is extruded, grasp it in the full hand, rub uterus evenly with the other hand, and gently exert traction on the membranes. Do not pull too hard or too fast on the membranes, because they will tear. Better to let the membranes come themselves than to draw on them so that they will break.

If the placenta does not come with the simple pressure, and you can tell that at the time, you may use the *Credé Expression.* The uterus is grasped as before, but while pushing it bodily toward the outlet of the pelvis, in a line with the axis, you squeeze the uterus together, the thumb on the palm, *i. e.*, you squeeze the placenta out "like the pit from a cherry." If this should not succeed with moderate pressure, wait 10 to 15 minutes. You may be sure that the third stage is pathological. After this time try again the Credé Expression. If not successful, wait 30 minutes. There is no danger as long as there is no hemorrhage, external or internal. You can wait 2 to 2½ hours with no danger to mother. What to do if the woman bleeds? Rub the uterus well. Fingers behind, thumb in front. Keep up the massage till the uterus is a hard ball under the hand. If hemorrhage now ceases completely no need to express the placenta, but wait, watching the uterus. If it

begins to relax, massage. If the oozing starts up, use the Credè expression, bearing in mind:

1. Uterus must be in the median line.
2. Uterus must be contracted.
3. The bladder must be empty.

In the treatment of post partum hemorrhage we will revert to this subject. After the placenta and membranes are born one may give the patient dr. 1 of ergot. *Never give it while there is anything in the uterus.* In primiparae, it is not necessary, but if you have no one to take care of the patient and you live at a distance, give it here. In the hard-working peasant women ergot is unnecessary and may cause severe after-pains, if she is a multipara. Other methods of treating the 3rd stage have been employed. The oldest is the practice of traction on the cord. Two fingers are passed along the cord to the placenta, traction is now made with the other hand, the placenta being forced into the hollow of the sacrum by the internal hand. Method unqualifiedly bad.

Objections.

1. If the placenta is adherent or simply incarcerated, it is inefficient.
2. It may produce inversion of the uterus.
3. Cord may tear off, leaving the placenta adherent.
4. Too much fingering in the vagina (infection).
5. No control of the uterus.

Up to 1861 this method generally practiced, even now there are some doctors who practice it.

In 1861 Credè, of Leipsic, formulated this method:

1. After the baby is born, massage the uterus until the first after-pain.
2. Press the whole uterus down toward the inlet and squeeze the placenta out at the same time.

Objections are:

1. It is not physiological.
2. Too rapidly emptying the uterus.
3. Hemorrhage is greater than with the method just given at length.
4. Retention of the membranes, especially the decidua, is more frequent. Also retention of pieces of placenta.

Bruising of the uterus may result.

For many years before this there was practiced in Dublin a procedure similar to Credè's, except that the time allowed for the expression was longer, called the Dublin method.

In 1880 Dohrn, and since 1882, Ahlfeld, have called attention to the objections to the Credè method and have proposed a purely expectant treatment of the 3rd stage.

Ahlfeld's Method.

After labor the hands are kept away from the uterus, but the cord put over the thigh and legs crossed. Dr. sits at the side of the patient, controls pulse and countenance, occasionally looking under the bed clothes to see if hemorrhage is occurring.

After two hours the woman is told to bear down, or the placenta is gently expressed in the manner indicated. Very often the placenta will be spontaneously delivered during the 2 hours. Still it may not, and in the absence of art might stay in the genital tract till it putrifies. As a rule, it is expelled in 3 or 4 hours.

Claimed for the expectant treatment that the loss of blood is less, that the tearing of the placenta and membranes is less, that the decidua is almost always delivered complete, and that the puerperium is not so likely to have slight rises of temperature. All these statements are not true. The average loss of blood with the expectant treatment is 400 to 500 gms. With the treatment I have given you it is less than 200 gms. With Credè's method it is 400 to 600 gms.

Objections to the expectant treatment are:

1. Loss of blood is greater than is necessary and may be dangerous to a small, anemic woman.
2. Keeps the woman in an anxious condition too long.
3. Takes too much time.

The treatment, therefore, of election is a combination of the two, one that embraces good points of both and avoids the bad ones. It is the one described at the beginning of this chapter.

1. Hand on the uterus after baby is born, no massage, but control.
2. After 35 minutes tell the patient to bear down. If not successful—
3. Press the placenta out gently, grasping the uterus in the whole hand, early expression. Remember three points:

Uterus contracted.
Uterus in median line.
Bladder empty.

4. If uterus bleeds or gets too large and soft, massage.
5. If simple expression unsuccessful, use Credè Expression.

Now examine the placenta carefully to see if it is complete. Make the examination minutely and systematically.

1. The Membranes. See that they are complete, noting the size of the opening. May fill them with water. If there are tags try to re-adapt them in place. If they are torn from the edge of the placenta, see if they will fit to it. If not, may be sure that part of the membrane is retained. See if amnion is complete, then chorion. If there is a piece of chorion missing, the decidua with it will also be missing.

2. The Placenta. Maternal Surface. Look around the edge. See if all the cotyledons are there. If a tear, see if the parts will fold together. If the edge is even all around almost always the placenta is complete, seldom that a piece is missing from the center. Notice if the decidua serotina is unbroken all over; see if there is not some defect. If the edge of the placenta is ragged suspect that a placenta succenturiata exists.

3. The Fetal Surface. Notice the course of the vessels. If they get too small to see, before reaching the edge, or if they break off suddenly at the edge. This means that there is a piece of placenta missing. If the membranes are not complete, leave them, if you have been clean. If there is a piece of placenta missing, larger than an English walnut, go in, with the fingers, and take it out, under rigid antisepsis. If smaller, leave it alone. If it causes hemorrhage, it must be removed, however small. Use sterile gloves.

Care of the Baby.

Formerly, and to large extent still, the custom to bathe the baby, after annointing it with lard or fat, to remove the vernix caseosa. By this process the child often gets blue, cold and chilled; further, many of the skin eruptions to which the children are liable come from the bathing. A better practice is to oil the baby with olive oil or albolene from head to foot, and then wipe this off with a soft linen towel. Pay particular attention to the creases, because the vernix accumulates there. Be careful not to get anything into the eyes. After the baby is dried, sterilize the cord with 1/2000 $HgCl_2$, or lysol solution, and wrap it in borated gauze, or sterile cotton. Then apply the binder loosely, turning stump of cord upward.

Before leaving the house there are 7 things to do:

1. See that the uterus is in a state of tonus, *i. e.*, well contracted, and that there is no inversion of uterus (rare, but does occur).
2. See that the bladder is not distended.
3. See that there is no hemorrhage from the vulvar orifice, and no internal hemorrhage.
4. See that all perineal and vulvar tears are attended to.
5. See that the placenta and membranes are complete.
6. See that the baby is in good condition, no mucus in throat, no hemorrhage from cord.
7. See that the woman is in good condition, no high pulse, no headaches, no vomiting, etc. Think of eclampsia, of internal hemorrhage.

If a perineal tear, it must be sutured. If slight or if vulvar tears, they may be dressed antiseptically. If kept clean they heal kindly. The nurse usually applies the abdominal binder to the woman; there is no objection to this, unless it be applied too

tightly. It relieves the empty feeling after the abdomen is emptied and tends to prevent syncope. Applied too tightly it forces the uterus down into the pelvis and may favor prolapsus uteri.

Stay in the house a full hour from the time the placenta is born, longer if you have the time. You must leave accurate (preferably written) instructions with the nurse, what to do in case of post partum hemorrhage, also a list of the places where you intend to go, so that you can be gotten in a hurry, if necessary.

Let us pause here to take a glance back at the treatment of labor as a whole. It should be regarded as a surgical operation; it really is such, and the obstetrician is really a surgeon. He considers every labor, therefore, *first*, as to the ability of the patient to stand the shock; *second*, to arrange for asepsis and antisepsis; *third*, he carefully watches for and provides against complications.

During the labor the accoucheur observes the powers and estimates the resistances, judges whether the powers are sufficient to overcome the latter; he watches the mechanism of labor as its various phases pass under the eye and hand; he is always alert to any abnormality in the mechanism, and keenly alive to the possibility of some outside complication occurring, which may throw either or both patients into acute danger. Through all he throws around both patients the protection from infection which, of recent years, has become almost perfect.

The conduct of labor is not a simple matter, safely entrusted to everyone. Let the people know that having a child is an important affair, worthy of the deepest solicitation on the part of the friends, needing the watchful attention of a qualified practitioner, and that the care of even a normal confinement is worthy the dignity of the greatest surgeon.

UNUSUAL MECHANISM OF THE HEAD. DEFLEXION ATTITUDES.

In certain labors the head enters the pelvis with the sagittal suture parallel with the transverse diameter of the pelvis. Sutugin, of Russia, claims that the majority do this. The head usually flexes and enters the pelvis flexed, then rotates so that the occiput comes anteriorly: 1. In certain cases the head does not flex, but comes down to the perineum with the large fontanelle, nearly on a level with the small fontanelle. This is called the military attitude. In these cases rotation does not take place till late, or may not occur at all. This condition is spoken of as deep transverse arrest of the head. 2. Again, the head comes into the pelvis in the oblique, but with the occiput directed posteriorly. O. D. P., O. L. P. If the head does not flex well, or if pains are not strong enough to rotate the occiput, the whole 135 degrees, so as to bring it anteriorly, it

remains in the transverse diameter of the pelvis and we have the same condition as before, deep transverse arrest, *i. e.*, the head is arrested in rotation, when it is deep in the pelvis.

Causes.

Both these cases are caused by:

1. Flat pelvis, the occiput meets with resistance sooner than the sinciput, therefore, no flexion.
2. Failure in the powers of labor. Uterus. Abdominal pressure.
3. Both ends of the head lever of the same length, *i. e.*, the sincipital end equals the occipital, called dolicocephalus.
4. Pendulous abdomen, back is at an angle with the head.
5. Prolapse of the arm alongside of the head, if arm before the occiput.

Findings.

Abdominally, the same as in occipito-posterior positions. (See later.) Vaginally, head deep in pelvis or a little lower than the mid-plane. Sagittal suture in transverse diameter of the pelvis, fontanelle to one side, small fontanelle to the other, both in the same plane. Head seems to be wedged in between the two rami of the ischia. Sometimes referred to as impaction.

Course and Terminations.

I. After remaining some time, flexion may occur, and the occiput may rotate anteriorly, and later terminate spontaneously. Requires strong pains. Usually the child is small.

II. Head may come out in the transverse diameter. Requires strong pains, large and soft passages, small child.

III. Occiput may rotate to the hollow of the sacrum.

Then there are two mechanisms in the latter event.

(a) Large fontanelle may sink lower than the small one and take the line of direction, rotating anteriorly, that is, deflexion occurs. These are called *forehead presentations.*

(b) Occiput comes over perineum with the head well flexed.

Second Unusual Mechanism of the Head.

It occasionally happens that the head enters the pelvis with the occiput posteriorly, and that this is kept up till the head reaches the floor of the pelvis. Instead of turning to the front the occiput remains posteriorly, or may even rotate into the hollow of the sacrum. These cases are called posterior rotation of the occiput. Sometimes occipito-sacral positions. When the occiput rotates to the sacrum and the sinciput comes down the front, they are called *forehead* presentations.

This is one of the terminations of deep transverse arrest, and occurs 1 in 75 cases (Kehrer).

The causes of occipito-posterior positions or forehead presentations are:

1. Flat pelvis. Here the occiput meets with resistance first; therefore, the two arms of the lever meet unequal resistance, flexion does not occur.

2. Extra large pelvis, or small child. The second twin very often comes in this position.

3. The sincipital end of the head lever equals the occipital end, primary dolicocephalia.

4. Pendulous abdomen, the convex back of the fetus fits much better to the posterior surface of the uterus.

5. Prolapsus of an arm alongside of the head. This mechanically prevents the occiput from rotating anteriorly. If the case was O. L. A. and the posterior arm down, prolapse will have no bad effect at all, rather facilitate the rotation.

6. Exhaustion of the powers before rotation completed. Rotation takes place in part, powers give out.

7. Interference, during which the occiput rotates to the sacrum. The position of the placenta may give the back an unusual situs. Tumors and scars in the uterus by altering its shape. Not all causes are known or fully explained. We have two forms of occipito-posterior positions:

1. That where the occiput is behind from the start, the forehead becoming the point of direction.
2. That where the case is one of deep transverse arrest, and an anomalous rotation took place. Etiology not clear.

In the first form we find the head high up, the small and large fontanelles on a level. This is sometimes called the military attitude, or median vertex presentation. The large fontanelle may be lower, *i. e.*, the deflexion has increased to a marked extent. Now, if the deflexion goes still further, the brow will be the point of direction, and we will have a *brow presentation*. If it goes further still, the face will come over the inlet, and we will have the last of the so-called "deflexion-positions," a *face presentation*. Thus, you see the three presentations, forehead, brow and face are simply variations of the degree of deflexion of the chin.

At the beginning of labor (we will take O. D. P., for example), we will find the sagittal suture in the transverse diameter, the large fontanelle to the left, the small in the right and behind.

In the course of labor it may happen that the occiput descends and rotation anterior takes place, but if this does not occur, the large fontanelle takes the line of direction (*i. e.*, the axis of the pelvis). It descends, the forehead meets with the anterior inclined

plane of the pelvis. Rotation of the forehead anteriorly occurs, the occiput going to the sacrum. Now the perineum bulges strongly, the brow stems behind the symphysis pubis, and under powerful pains the occiput rolls over the perineum. After the occiput escapes, the nape of the neck is applied to the perineum, and then the faces comes out from behind the symphysis. The delivery of the rest of the body is usually the same as in the occipito-anterior position, but there is likely to be an increase of the rotation in external restitution. Extreme flexion takes the place of 4th movement of anterior position (extension).

The delivery is much more painful, tedious and requires stronger uterine contractions, and aid from the abdominal muscles. Reasons are:

1st. The greatest circumferences of the fetal head have to pass the vulva. Instead of sub-occipito-bregmatic, sub-occipito-frontal diameters, there are occipito-frontal and occipito-mental.

2nd. The nape of the neck is stretched, the chin being strongly pressed on the sternum and the back has to enter the pelvis and pass through the outlet, as the occiput goes over the perineum.

3rd. The fetal axis pressure works thus at a great disadvantage as regards power, and directly against the perineum; therefore, the tendency for the perineum to tear is quite marked, and this is almost always the case in primiparae.

Operative termination of the labor is very common if the fetus is large. Since in one-half the cases the fetus is small, on the whole, aid is seldom needed. One is sometimes surprised in protecting the perineum to find the face coming behind the pubis and the occiput coming over the perineum. Or it may not be recognized till after the head is born. These labors are usually in multiparae with small children, or the parts are so large or the fetus so small that no mechanism is necessary for the passage of the head through the pelvis and labor is not delayed; on the contrary, may be very rapid.

The 2nd form of occipito-posterior position where the occiput rotates toward the sacrum from a position of deep transverse arrest may terminate, either by the forehead stemming behind the pubis and the occiput coming over the perineum, or the head may be well flexed; the occiput will then come over the perineum till the nape of the neck sinks on it, then the forehead and face come from the vulva. Labor is slow only in the primiparae, or where the head is of normal size. The danger to the perineum is as great in the latter variety, but this is not the commoner method.

The maternal and fetal mortality is higher than in ordinary head presentation, especially the fetal, since the 2nd stage is very long, and the uterus is much stretched, the fetus being extended, and premature separation of the placenta is more likely to occur. Mortality, according to Hecker, is 9%.

In occipito-posterior position the labor is generally longer, slower, the pains being weak, irregular. This is so common that a delay of this kind is presumptive of this position. The bag of waters often ruptures early, and in general, things do not go smoothly. The head stays high up, longer than in anterior positions; stronger pains are necessary to bring it well down into the pelvis, and after anterior rotation has been started, the uterus and abdominal pressure may prove unequal to the task of forcing the head all the way around. The labor, therefore, comes to a standstill, the woman does not use the abdominal muscles, the uterus acts feebly. This is so-called *uterine inertia*, but it is as much weakness of the abdominal muscles. Unless aid is given the uterus may rupture, the child may die, or vesico-vaginal fistula result from long pressure of the head against the soft parts.

Treatment.

As will be seen from the study of the cases, one of the main reasons that the occiput does not rotate properly is that flexion of the chin on the sternum does not occur, or persist. (Hodge.) Our efforts therefore must be to aid and keep up "flexion."

Another reason is that the back does not rotate to the front.

1. When the head is high up, not fully engaged, let the woman walk around, or lie on that side to which the occiput points. Remember, that O. D. P. positions are physiological, that gravity alone can produce this position. Therefore, watchful expectancy at this period. Most you can do is to put her on the right side, or left, if the occiput be directed to the left. By this means the breech is thrown over to the side on which the occiput lies, the spinal column is straightened, and the occiput is forced down. This increases the flexion and, therefore, rotation is favored.

Be careful not to rupture the bag of waters, as this interferes with the mechanism of labor and usually aggravates the condition.

2. After the head has engaged, and in spite of the good, strong pains, the rotation of the occiput anteriorly does not occur, keep the patient on the side. Wait patiently, because rotation almost always occurs. May try the knee chest posture.

I. Hodge's maneuver. During the pain press up on the sinciput. This causes flexion and, therefore, rotation. Failing in this:

II. Tarnier's procedure. Pass the fingers behind the ear, and during a pain try to rotate it forward, pressing the forehead to the back with the hand on the abdomen.

III. Pass the half hand and try to turn the head. All these should be done gently; don't persist in them if they require too much force. Use the external hand to operate on the breech and shoulders. The inside hand may push over the shoulder also. Failing all three, use the forceps. (See next year.)

Face Presentation.

Face presentation occurs 1 in 200 cases; 232,637 analyzed presentations gave 1 to 198. If the face is the part touched by the examining finger, *i. e.,* bounded by the girdle of resistance, we speak of a face presentation.

In the face presentation, the chin is the point of direction, and we distinguish the same positions as in occipital positions.

1. Chin to left and front, Mento-laeva anterior.
2. Chin to right and behind, Mento-dextra posterior.
3. Chin to left and behind, Mento-laeva posterior.
4. Chin to the right anterior, Mento-dextra anterior.

Frequency of the various positions varies in different statistics. In general, they are as above given. But one very seldom observes the 3rd and 4th. Why?

Causes.

Primary and Secondary.

Certain causes acting during pregnancy may even bring about a face presentation in the latter weeks. These are called primary causes, and are:

1. Movements of the neck muscles and the adaptation of the lower uterine segment to the head in a deflexed position.
2. Hydramnion. Experiments by a Frenchman named Blanc, show that in a large quantity of water, the fetus sinks to the bottom with the head deflected.
3. Congenital goitre.
4. A very fat baby.
5. Tumors of the occiput.
6. Anencephalia. "Snout-labors" (Ahlfeld).

Certain factors cause a deflexion of the head during labor. Such are the secondary causes.

1. Contracted pelvis.
2. Dextro-version of the uterus, and obliquity of uterine axis to the inlet.
3. Placenta previa (rare).
4. Tight cervix (rare).

In general, it is said that the face cases are usually large children, but this is denied by the author.

Attitude of Fetus.

The head is completely extended on the back, the forehead is flattened, the occiput long drawn out. The neck is stretched, sometimes there are cracks in the skin from over-stretching. The chest is protruded and is convex. The back is sharply incurved to receive the occiput, while the breech is turned to the back. The fetus is lengthened, while its axis takes the shape of the letter S.

Diagnosis. Mento-Dextra Posterior Position.

Abdominally. Longitudinal ovoid. Head over the inlet. Breech and small parts in the fundus. Hard to feel the back. On one side of the inlet can feel a large, hard prominence and above this a deep furrow. On the other side, hard to feel anything. Sometimes possible to make out a horse-shoe shaped jaw.

The feet are on the same side as the breast, *i. e.*, the right side; the heart tones also are on the right side, since the breast is applied to the uterine wall. Important finding, that the extremities and heart tones are on the same side. Three points of face presentation are: 1st. Large, round occiput on one side, with a deep furrow above it. 2nd. No tumor on other side or possibly can outline the jaw. 3rd. Extremities and heart tones on the same side. Heart tones very loud because so near the ear. In these cases may feel fetal heart.

Vaginally. Early in labor, the pelvis empty. Bag of waters not round, but irregular, and persists between pains. High up even in primiparae, an irregular, square body, generally movable. If the bag of waters ruptures, there is generally no difficulty in recognizing eyes, orbit, nose, mouth. The chin is usually out of reach, as is also the large fontanelle, unless it be a brow presentation, or a face, in the process of transition. No hard, rounded tumor but one with prominences and depressions. Occasionally find a face presentation at the beginning of labor which changes to occiput.

The most important diagnostic point is the saddle of the nose. This can be recognized even if the face be swollen by the disfiguring caput succedaneum.

The mouth and nose are in the "facial line," also the chin. The facial line in M. D. P. lies in the 1st oblique diameter of the pelvis. Chin is the point of direction.

After the head has come down, the face is more easily reached, and then usually the whole of its outline, including the chin, can be palpated. Difficulty arises now because the face may be so swollen and disfigured that the parts are hard to outline. The root of the nose will help out here. The finger in the mouth feels 2 gums and the tongue (which sucks if the child is alive). The most common mistake is to think the face is a breech. In Mento-Laeva Anterior, diagnosis is the same but points are transposed from left to right.

Mechanism of Labor in Face Presentation.

The face is usually high up at the beginning of labor. The first movement is *extension*, not flexion. If the case was one of primary face presentation very little extension is necessary to complete the movement, but if one of the secondary forms, the forehead or brow presents, and it requires that resistance be met to form the complete face presentation. These transition forms can be often diag-

nosed if patient is examined early enough. The brow end of the lever is longer; therefore, the chin goes down, the brow being held back.

The second movement is *descent*. This is due to the same causes as in vertex presentation. G. I. U. P., F. A. P. and gravity to a less extent. Flexion and descent occur at the same time in vertex presentation, extension and descent in face presentation.

The third movement is *anterior rotation*. The chin is the point of direction and rotates anteriorly. Mechanism is the same as in vertex. The rotation is brought about by the rotation of the trunk to the front, and the anterior inclined plane of the pelvis. Sometimes face has to come deep on the pelvic floor before rotating.

Anterior rotation must start early because the head cannot enter the pelvis with the chin entered behind. This would bring the occiput and the chest into the inlet at the same time, which is possible only under exceptional circumstances, *i. e.*, small and soft child, large pelvis, strong pains.

The labor is harder, slower. The pains must be stronger to effect rotation. The soft face pressing against the lower uterine segment does not evoke such strong contractions as the hard vertex. The face seems to be farther in the pelvis than it really is. One believes the head engaged when the bi-parietal diameter really is still above the inlet. This is due to the greater length of the lower part of the head.

In vertex presentation the greatest periphery of the head is about 3 cm. above the point the finger touches. In face, the greatest periphery is 7 cm. above the point the finger touches. Therefore, be careful in saying whether the head is engaged or not.

Remember, also, that the anterior rotation may not occur till the head is well down on the perineum. The chin always turns into the transverse diameter at least before reaching here. Face descends, chin selects the diagonal and the rotation completing, the chin appears at the vulva. Perineum bulges less than with the vertex, mouth appears first, then the chin, the neck stems behind the pubis and the nose, forehead, large fontanelle, and vertex sweep over the perineum.

The 4th movement is one of *flexion*, not extension; the chin flexes toward the sternum and rides on top of the symphysis.

The fifth movement is *external restitution*, *i. e.*, the chin rotates to that side which it had in the uterus. The delivery of the trunk is similar to that in vertex presentation.

In all face presentations it is highly important that the chin comes anteriorly. Unless this occurs, labor is seldom possible.

The same anomalous mechanisms can take place with the face as occur with occiput presentations.

1st. Deep transverse arrest of the chin. Face comes down well on the perineum, but anterior rotation does not occur. Under very

favorable conditions, *i. e.*, strong pains, small child, large and soft vulva, child may be delivered in this position, but may not, and if aid is not rendered both may die.

2nd anomaly. Chin may remain at the right sacro-iliac joint or rotate posteriorly, and we have a condition analogous to posterior rotation of the occiput.

These cases are pathological and very dangerous for both mother and child. But still nature may terminate them in one of several ways:

1. Rotation of the chin through an arc of 160 degrees, and then chin under pubis, normal termination.

2. The brow may stem behind the pubis, the chin and mouth then come over the perineum; neck on the perineum forms the center, the forehead, vertex, and small fontanelle rotate from under the symphysis.

All these are pathological, and only in exceptional cases to be relied on. Child very often dead and mother exposed to the dangers of ruptura uteri and ruptured perineum.

Clinical Course.

In face presentation the labors are usually more tedius, the pains are not so strong. The face does not engage till late, though it is low, but must be well down on the perineum before the biparietal diameter can pass the inlet.

Labor is longer in the first as well as in the second stage. Effacement and dilatation of the cervix are slower. Bag of waters likely to rupture earlier.

In primiparae the length of the labor is 3 to 4 hours longer than with occipital presentation; in multiparae, 1 to 2 hours. But sometimes the labor lasts many hours, may be days, in both, while it may proceed rapidly, ending in a few hours. The cause of the face presentation has something to do with it, e. g., contracted pelvis, large child. But with all this, face presentation must be considered as Eutocia, though it may easily become pathological. In almost all cases patient is able to terminate labor herself. Formerly all cases were operated on at sight, but this is bad practice.

Prognosis.

For the Mother. Mortality higher than the vertex presentation, due to longer labor, greater danger of infection (not so much nowadays), vesico-vaginal fistula, and the necessary operations (also the unnecessary ones).

Boer had 90 face presentations, one forceps, 4 dead children, and his work served to change the tendency to operate in all face cases.

For the Child. Mortality is higher because the labor is longer,

especially the second stage; the pressure of the neck against the symphysis may cause cerebral hemorrhage or injure the trachea, both seldom. Mortality is twice that of vertex presentation, *i. e.*, 15%.

Plastic Changes.

Face is horribly disfigured, especially if the labor has been long after the rupture of the bag of waters.

Caput succedaneum forms on the cheek and eye, later over the whole face. Eyes bulge out and ecchymotic, lids swollen, face swollen, blue, and small hemorrhages, lips sometimes so swollen that the baby cannot nurse for some days. May be a muco-serous discharge from the eyes in severe cases. Ophthalmia neonatorum. Scratches from the examining finger on the face and eyes. Head flattened out, top of head may even show a saddle-like depression at region of the large fontanelle. Occiput long drawn out, head being dolico-cephalic.

Child keeps the extended attitude for one to four days. If it was a primary face, longer, if a secondary, not so long. The changes of the face disappear in a few hours to 5 days, depending on the degree and this depends on the length of labor. Reassure the mother that the child will again look like a baby.

Treatment.

Face presentations are normal, therefore no other than that of vertex presentation, unless something happens to indicate operation.

Higher Degree of Expectancy. During the examination be careful not to rupture the bag of waters. Be careful not to scratch the eyes or face, and especially not to infect the eyes with the vaginal secretions. If the head is found in a transition from vertex to face put the woman on the side to which the occiput points. If the face presentation is formed, put her on the side to favor descent and rotation of the chin, *i. e.*, that side to which the chin points.

In the first stage, do nothing except to build up patient's strength. In the second stage, *Expectancy*, arbitrary limit is 7 hours. Do nothing except under the strictest indication, since the operations are harder and worse for the mother and child. Can wait 7 hours, because the soft face is not so likely to cause fistulæ as the hard head. Watch uterus carefully. Difficult to protect the perineum, since one cannot press on the face. Still, may try to get the best diameters through the vulva. In primiparae, perform episiotomy. Some authors advise transformation of face to a vertex presentation, others advise to turn the child around and bring the feet down. The latter operation must be reserved for special indications. Under special conditions we change a face presentation into vertex, such as

chin posterior position. Operations can only be done before engagement has taken place, or it causes serious injury to the passages. If done when the head is high up, face position may recur. In general, it is better to pursue a purely expectant plan of treatment with face presentation. See senior notes.

Brow Presentation.

One may find, in the first stage of labor, the head over the inlet in such a stage of deflexion that the brow is first touched by the examining finger. This condition seldom persists. Almost always either flexion or extension of the chin occurs, and we have from the first an ordinary occipital presentation; from the second, a face presentation. Latter more frequent, and if you can feel the root of the nose, almost certain it will be a face. Still, should the head enter the pelvis in the middle position, it can hardly change now, and passes through the pelvis in a brow presentation. The posture is pathological, and very often requires aid. The point of direction being brow, we have the same names as in the others, *i. e.:*

Fronto Laeva Anterior.

Fronto Dextra Posterior. Only two occur in nature.

Causes are the same as for face presentation. Principally, the causes which make a deflexion of the chin. The attitude of the fetus is similar to that of the face presentation.

The *diagnosis* is nearly the same. The continuation of the facial line, the frontal suture, is used in determining the position of the head. The root of the nose at one end and a large fontanelle at the other. Thus, in fronto laeva anterior, one feels the large fontanelle to left side. The root of the nose to the right. The frontal suture usually runs in the transverse diameter.

In the right fronto-posterior, the large fontanelle is to the right, the root of the nose left. Can feel the point of the large fontanelle. Other points in the diagnosis are the same as in the face presentation.

Mechanism.

(1) Descent: (2) extension or flexion is not marked, head comes down in the middle position. Frontal suture generally takes the transverse diameter. Now the brow rotates to the front, the occiput rotates to the sacrum. Mechanism complex. The brow appears, then the eyes, the chin extended behind the pubis, and then the whole vertex rolls over the perineum. Now the chin comes from behind the pubis. Whole mechanism is slower, harder and dangerous to mother and child. Great danger to the perineum because the largest cranial diameters are opposed to the outlet. If the child is large, operation almost always necessary. It is said

that brow cases are small babies, thus labor can sometimes end spontaneously.

Prognosis.

Bad. Fifty per cent. of the children are still-born, according to Hecker. Ahlfeld has had a low mortality rate. For the mother, prognosis is worse than face presentation.

Plastic Changes. Head is flattened out between the chin and large fontanelle. Distance from chin to top of forehead is very great. Head presents a characteristic three-cornered outline. Forehead is high, face flat and the line from the forehead to the occiput is steep.

The caput succedaneum situated on top, increases the length of the brow. The occiput is pressed into the nape of the neck.

Treatment.

If the case is one of transitory brow presentation, expectancy. Should the head remain fixed in this posture, justifiable to change it to a vertex presentation, to a face, or to do a version by the feet.

After head well engaged one may flex the head, producing an occipital presentation, or complete deflexion, making a face presentation, but the maneuver may only be done by skillful hand, as it may cause grave injury to the maternal tissues. Forceps, if there is an indication besides the mal-position.

BREECH PRESENTATION.

The child presents itself for labor with the breech in advance in 2 7/10% of the cases. In general terms, 3%. There are several varieties of breech presentation:

1. The complete breech, in which the buttocks with the feet alongside present at the os, or are bounded by the girdle of resistance.
2. Incomplete breech presentation where,
   (a) One foot has (or maybe 2) fallen down into the vagina, footling presentation.
   (b) One knee has fallen down into the vagina—knee presentation, or both knees.
   (c) Where the feet are turned up against the face, the legs being extended at the knees, the two limbs being laid on the front of the body like a splint, sometimes called "single" breech presentation. By the French "mode de fesses."

The labors in all run about the same. Therefore we will not consider each separately, but take them altogether, using the complete or "double" breech (as it is sometimes called) for the example.

Causes of Breech Presentation.

Not certainly known, since the baby may present no causes, nor the mother. Still breech cases often occur in the following condition:

1. Maternal.
   (a) Anything that will prevent the engagement of the head; e. g., contracted pelvis, tumors in the pelvis, placenta previa.
   (b) Hydramnion (free to move around).
   (c) Multiparity.
2. Fetal.
   (a) If the head is too large to get into the pelvis, e. g., hydrocephalus. It is usual for the hydrocephalus to come last. Some tumor of the neck or head, e. g., goitre, lymph-angioma.
   (b) Small fetuses and large amount of liquor amnii, therefore in premature births breech presentation is common; in twin pregnancy one child likely to be a breech. Said that scrub women have breech presentation frequently from the position assumed by them (?). Often no cause discoverable.

Positions of the fetus in utero.

There are four positions, but in nature only two are commonly observed. The child may lie with its back to the right or to the left and it may be directed more anteriorly or more toward the back of the mother. The sacrum is the point of direction. The posture of the fetus is the same as in the vertex, but is inverted.

Findings in Sacro Laeva Anterior.

Complete Breech. More common attitude.

Abdominally. Longitudinal ovoid. Over the inlet one usually feels nothing, or the breech. Right, at fundus, the head. Shoulder above navel, median or a little to the right. Back to the left. Heart tones to the left, in front 1½ to 2 inches *above* the trans-umbilical line. Head usually near liver.

Vaginally. Usually the breech is high up. Even in primiparae it does not engage till late. Bag of waters often ruptures early, since the lower uterine segment is not applied to the presenting part. Feel a soft body that is not the head, irregular outline, but can generally make out two soft prominences, deep depression between them; to each side may feel tuberosities of the ischia. The anus may be felt, contracts on the finger, and you may find some meconium on the finger. Between the two tuberosities of the ischia can feel a crease, the genital crease. Following this up (in S. L. A.), feel the scrotum or vulva behind, to the right. Anterior and in

front can feel a triangular bone with three or four prominences on it—the sacrum. This is the point of direction and the quadrant of the pelvis in which it lies gives the position. The anterior buttocks is more easily outlined. Alongside the buttocks of the child toward the right side (in S. L. A.) you can feel the feet. Usually one is felt, sometimes two. Observe care in diagnosis. Mistakes common, e. g., with face, bag of waters, etc.

If it is a *footling presentation*, the foot which is down, will help in diagnosis. Diagnose foot by direction of big toe and the flexure of the knee, by following it up part way into the vagina. Can see if it is the anterior or posterior foot. This point settled, next decide the position of the breech in the pelvis. A foot may prolapse with a vertex presentation.

In *Single Breech*, when the feet are extended along the chest and face, it may be possible to feel the feet alongside the head, through the abdomen. Otherwise the abdominal findings are the same as in other forms. The uterus is longer and straighter. It is arched in the other breech presentations. Vaginally, one feels the nates only and determines the points as before given. Do not pass the finger too far into the anus, because it may excite respiration. The advice is usually given, but the author has seen no case where such an accident occurred.

Mechanism of Breech Presentation.

Must consider mechanism of the breech, shoulders and the head. Sacro Laeva Anterior. Movements of the breech.

Breech almost always remains high up, even in primiparae, till labor is well advanced. The movements of the breech are of the least importance, those of the head and shoulders being most important.

1st Movement. Descent. Slow, due to same causes as in occipital presentation and occurs at the same time.

2d Movement. Flexion. Body flexes toward the side to adapt its axis to the axis of the inlet.

3rd Movement. The breech comes down with the bisiliac diameter in the left oblique, the genital fissure in the right oblique.

The anterior hip points to the right ilio-pubic tubercle, the anterior buttock is a little lower than the posterior, the obliquity of Nägelè.

The breech has descended to the floor of the pelvis, but the feet are usually held back a little. Now *anterior rotation* takes place i. e., the anterior hip rotates to the front and comes under the symphysis, bis-iliac diameter now antero-posterior, the genital fissure in the transverse diameter.

4th Movement. The anterior hip becomes visible in the vulva and stems behind the pubis, the posterior hip rolls over the perineum,

The whole pelvis rises up toward the pubis. This is especially marked in cases where the perineum is well preserved.

5th Movement. External restitution. Breech rotates so as to bring the back to the front, may even rotate to the other side. This is called external over-rotation, and may occur with the head also. It has happened with the breech as well as the head that the internal anterior rotation was excessive, the point of direction passing the median line over into the opposite anterior quadrant of the pelvis. This is called internal over-rotation. Causes not known, but a large pelvis required. One can draw no positive inference of the position of the head and shoulders from the position of the breech. After the shoulders are delivered can tell the position of the head.

Movements of the shoulders are the same as those of the breech. Descent occurs with the bis-acromial diameter in the left oblique. The arms lie folded across the chest. More muscular exertion is needed to force the shoulders down. The anterior shoulder lies near the right ilio-pubic tubercle and rotates to the front. Now the shoulder stems behind the pubis, and the posterior shoulder is delivered first, over the perineum. Then comes the anterior shoulder. The back now rotates to the front. The nape of the neck resting under the pubis.

Mechanism of the Head.

Is the same as in occipital presentation. When the shoulders are at the vulvar orifice the head begins to enter the pelvic inlet. The head is well flexed on the sternum. The same diameters are opposed to the girdle of resistance, but they are in an inverse order. The head presents the shape of a double wedge; in vertex presentation the obtuse angle A goes in advance. In breech presentation the acute angle B goes in advance, therefore the head will go through the pelvis easier in breech presentation than in head presentation, which is in accordance with the fact.

Movements are (1) descent; (2) flexion: anterior-posterior diameter of the head enters pelvis in right oblique, as in occipital presentation; (3) anterior rotation occurs as a result of the ordinary mechanism. The occiput comes to the pubis, the chin rotates to the sacrum. Now flexion (4) takes place, the nape of the neck being the center and the chin, face and forehead come over the perineum, then the occiput comes from behind the pubis. There is no external res-

titution. Mechanism in right sacro-posterior the same, but with a change of the terms. In posterior breech cases the back often rotates across the pelvis in front of the promontory of the sacrum to the opposite side, traversing three-fourths of a circle, before delivery.

Plastic Changes.

The caput succedaneum is found on the anterior hip. In the case of S. L. A. on the left. But the swelling may extend over both hips, and the genitals, which especially in the male are likely, if the labor be long, to be swollen, the scrotum becoming blue and edematous. In girls there may be a slight leucorrhea the first few days. The head is not moulded ordinarily. Owing to its rapid transit through the pelvis it is not changed in shape, but preserves the round shape it had in utero. More true of multiparae. If the labor is very long, especially if the bag of waters rupture early, the child stayed a long while in the dry uterus, from the continued pressure on the top of the head by the fundus uteri, this is likely to be flattened and the child be a little dolico-cephalic. This was especially pointed out by Fritsch. Also the head may be asymmetrical owing to the pressure of the uterine wall against its anterior surface. This sometimes persists for years. A shortening of the opposite sterno-cleido mastoid muscle has been observed. (DeLee.)

The Clinical Course of Breech Labors.

During pregnancy breech presentations sometimes cause symptoms that attract attention. Women often complain of pain and distress in the epigastrium, due to the pressure of head, and this is relieved if the fetus changes position. Lightening does not occur. If there is oligo-hydramnion there may be a congenital shortening of the neck muscles of one side, owing to the cramped position of the head. One of the causes of wry-neck.

Breech labors on the average are shorter than the head labors, but this is due to fact that many are premature births and small children.

Reckoning only full term children, the labors are a little longer than the cephalic cases. This is especially true of primiparae.

The breech remains high in both till the cervix is well dilated, then it comes down. The bag of waters ruptures early more often than in head cases. If so, the effacement and dilatation are slower. In multiparae the breech comes down rapidly, rotates to the front and is delivered, the shoulders quickly follow, the arms being at the side of the chest. A few pains, or one long pressing pain by the abdominal muscles, and head is expelled.

In primiparae, the whole mechanism is longer, more pains are necessary to expel the child. Sometimes in spite of good, strong

pains the breech does not move for hours. Finally the breech comes down and the shoulders are delivered; the head is more likely to be arrested, owing to the tight cervix and perineum. Both are also in more danger of being torn.

During the labor, meconium may escape freely. This is especially true while the breech is coming over the perineum. Has no significance, being due simply to the pressure of the uterus on the body of the child, the region of the anus being under less pressure; therefore the same causes as those of the caput succedaneum. If meconium escapes before breech is engaged it has the same significance as in head cases.

In cases where the breech is complete, the delivery of the shoulders and head is more easily accomplished, since the cervix and perineum are more completely dilated. If the small body goes before, the cervix is poorly prepared for the large head. This is an important point in the treatment because if the cervix is not well dilated it may close on the neck of the child and imprison the head in the uterus. See Senior Notes.

Prognosis.

For the mother the general prognosis is very good, still it is not so good as in occipital presentation.

I. Labor is longer. The mechanism of effacement and dilatation of the cervix is not so complete. But the labor is easier than in head presentation.

II. Lacerations of the cervix are much more common, likewise lacerations of the perineum. Complete tears into the rectum are most often found with breech presentation, due to the rapid passage of the head through the vulva, but they are mostly errors of art.

III. Disturbances in the mechanism of labor are very likely to occur. The arms may be displaced upward, over the head or into the neck, the head may rotate in a wrong direction; all these cloud the prognosis for the mother.

If none of these accidents happen, if the patient is in the hands of a clean and careful accoucheur, the prognosis is good as far as the mother is concerned. Breech presentation is Eutocia and should not be interfered with.

For the fetus the prognosis is less good. Mortality is over 10%, often 13% or 14%, but with the best treatment the mortality should not be over 5%, if as high.

The child is in danger of asphyxia after the breech is born.

1st. From *compression* of the cord between the soft parts and the fetus. When the breech appears the navel is just passing the external os, and now the danger begins. This is not so important as the

2nd. *Premature detachment of the placenta.* When the head is

expelled in head presentation the placenta is generally separated wholly or in part, but the child can get air.

In breech presentation, after part of the body is delivered, the placenta begins to separate, but the fetus is not ready to begin extra-uterine respiration yet. If it starts to breathe, it sucks in liquor amnii and blood.

3rd. Even if the placenta remains in place, it may be so *compressed by the hard head* that there is interruption of the circulation in the placenta, therefore too early inspiration. In vertex presentation the soft breech presses against the placenta.

4th. The exposure of the body of the child to cold may also incite too early respirations.

A child will live after the breech is born before complete expulsion, from 5 to 10 minutes. Exceptionally after 10 minutes, and there are cases on record where a child survived 15 minutes or more after the breech was born. Not to be expected. It is the same time that a child will live in the uterus after the sudden death of its mother. The delay in delivery due to anomalies in the attitude or in the mechanism may cause asphyxia. The arms may strip up above the head, the neck may be tightly grasped by the cervix.

Finally injuries to the child are more common in breech presentation, especially during extraction.

Breech presentation is Eutocia for the child also.

In old primiparae, where the vulva and vagina are tense and rigid, there is much more trouble in extracting the breech, and the danger of maternal injury and fetal asphyxia is much greater. In them breech presentation is sometimes Dystocia.

Treatment.

Watchful expectancy, as long as there is no danger to the mother or fetus. Be careful not to rupture the bag of waters. Woman may walk round a little, resting often.

Remember that the first stage is longer, especially in primiparae.

When the cervix is dilated and the second stage begun, place the patient across the bed in the lithotomy position or on a table, which is better. Do not use an anesthetic, unless some operation is necessary, or the patient is unruly, because you want the patient to bear down and express the child herself. Have everything ready for treating asphyxia of the new-born child, i. e., warm towels, hot bath, tracheal catheter. Sit by with sterile hands, and watch the breech appear, doing nothing unless it comes too slowly. Wrap a warm sterile towel around the breech as it appears. If the foot comes, do not interfere with it.

When the navel appears tell the woman to bear down. She must expel the child quickly. If she does not, or is anesthetized, have an assistant press down on the fundus with his full hand. This presses

the fundus against the head and elicits strong pains, and also helps expel the child.

By *extraction* we mean the operative delivery when a foot presents, or when the whole of the fetus is *in the parturient canal.*

By *manual aid* we mean the assistance rendered after the natural powers have delivered the fetus *to* the shoulders, and we aid the birth of arms and head.

Differentiate these well.

The indication for finishing the labor is asphyxia, and the signs are:

1. Slow pulsation in the cord, which can be felt running from the navel up into the uterus.

2. Inspiratory movements can be seen or felt.

3. The passage of meconium has very little significance here, but a great deal in cephalic presentation; unless the breech is still not engaged.

Manual Aid.

Have an assistant press down well on the fundus. Grasp the breech of the fetus in both hands, thumbs over the sacrum, index fingers on the crests of the ilia, other three fingers on the upper part of the thigh. Make traction in the line of the inlet, i. e., downward, gently, steadily. When the anterior scapula is palpable or visible under the pubis it is time to deliver the shoulders and arms.

Deliver the posterior arm first.

Grasp the feet with the hand and pull them to the groin in the direction of the abdomen of the baby, this pulls the shoulder down and helps to rotate it into the hollow of the sacrum, where there is more room for the necessary manipulations. Here pass two fingers (*leave the thumb outside*), over the back and shoulders of the fetus down the humerus to the elbow. Now pull on the elbow so as to bring it down over the chest of the fetus, so that the infant's hand wipes across the face. Do not press on the humerus, because you might break it. Always press on the elbow and do not pull the shoulder down so as to bring it into reach, since fractures of the clavicle almost always result; pass the fingers high up; if two not enough, take four. Leave the thumb outside always.

After this arm is disengaged let the baby fall into the two hands, place the delivered arm against the chest as a splint and gently turn the baby so as to bring the other arm behind nearly into the hollow of the sacrum. Now take the feet of the baby in the hand as before, pull them toward the groin of the opposite side, and extract the second arm in the same manner as before.

Let the baby fall into the hand that brought down the second arm so that the baby rides on it, one foot on each side of the forearm, put the index finger into the mouth, or two fingers, and flex

the head on the sternum; usually find the mouth off to one side. If so, can easily bring it behind and to the median line. Now put the fingers of the other hand over the neck fork-like, well down on the sternum (to save the clavicles), and make gentlest traction downward till the nape of the neck is well under the symphysis. Have the assistant press down from above to make the minimum amount of traction below necessary. Now stand off to one side so as to see the perineum, and bring the chin out over the perineum, letting the nape of the neck rest under the pubis, face, forehead and occiput appear by flexing the head over the pubis. If any trouble experienced, do the Martin-Wiegand method.

If (after the breech is delivered) the cord be too tight so that you cannot pull down a loop, cut it. If the cord is between the legs over the buttocks, slip it up, if too tight cut it and hurry.

Have an assistant exerting constant pressure over the fundus with both hands. Idea is to prevent arms from sliding alongside the head and to prevent deflexion, also to make too much traction below unnecessary.

After the shoulders are delivered the harder part of the operation is completed. Usually the fetus is in little danger and there is time to do episiotomy, if it is deemed necessary. Still if you are going to do episiotomy do it before the breech comes out. It is generally done in primiparae.

The method described is known as the *Smellie Veit* method. Sometimes called the Mauriceau-La Chapelle method. There are very many methods for these cases, but this is now most generally practiced and is almost always successful. In abnormal cases it is very successful, but in normal cases it is usually not necessary, nature ending the labor herself. The Martin-Wiegand method is also a good one.

Treatment, Then, of Breech Presentation Is:

1. Watchful expectancy (unless some indication) till breech is born to navel.
2. Tell the woman to bear down.
3. Assistant makes pressure on uterus.
4. *Manual aid,* of which there are three stages or acts:
    1. Delivery to the shoulders;
    2. Delivery of the arms;
    3. Delivery of the head.

Treatment of *footling presentation is the same.* Do not pull on the foot. Replace it in the vagina and if this does not succeed, wrap it in a sterilized warm towel.

Unusual Mechanism of Breech Presentation.

1. The back may rotate to the back of the mother and the belly to the symphysis.

Terminations (a) may finally rotate to the front; (b) may be delivered in this way:

2. Arms may be drawn up over the head, or into the neck.

3. The head may come with the occiput directed to the sacrum, the chin to the symphysis.

Terminations:

a. Chin flexes, head delivered with the occiput behind;
b. Chin extends over pubis, occiput comes over perineum, child being lifted up; face comes out last;
c. Rotation finally takes place or is produced by the accoucheur.

All are pathological and will be considered next year.

TWINS.

The occurrence, causes and diagnosis of twins were already discussed, under "Pregnancy."

The same remarks apply to the diagnosis of twins during labor as during pregnancy.

Attitude of the Fetuses.

Many positions possible. Most common is both fetuses present by the head, 53%; next, one head, one breech, 29%; both by the breech in 9%; one transverse and other longitudinal, and finally, both transverse (most rare).

When the presentation is longitudinal the children lie in utero with the bellies apposed, the backs to either side. One is usually a little lower than the other, and this one usually engages first, though it may not.

There is almost always a fold of membrane between the fetuses, which more often has four layers, two amnions and two chorions. When the fetuses come from one ovum there are only two layers (amnions), and it has happened that this has atrophied, and the two children were free in one amniotic cavity. In these cases the cords can become twisted around each other and parts of the bodies. Very rare occurrence.

The Clinical Course of Labor.

Labor, especially the first stage, is usually very slow. The great distension of the uterus prevents it from contracting strongly. Therefore effacement and dilatation of the cervix are slower. Owing to the great abdominal distension, edema of the feet, dyspnea, albuminuria and eclampsia are more common.

The mechanism of the expulsion of the first child does not differ from the normal, be it a head or breech presentation. Still twin births are very likely to have irregularities, and become dystocia.

After the expulsion of the first child there is a pause. This may be from 10 to 60 minutes. Exceptionally several hours, and in very rare cases days may intervene, before the birth of the second child. During this pause there is generally a small amount of blood lost. It sometimes happens that the placenta of this child is now delivered; pathologically, the placenta of the second child may be delivered.

If the second twin comes spontaneously the delivery is very rapid, since the pains are now stronger (the fibres of the uterus having gotten somewhat shorter), and the parts have been dilated by the first so that little resistance is met by the second child.

After this child is born there is a great tendency to hemorrhage because of uterine inertia. The great distension of the uterus has diminished its contractibility and retractibility. Anomalies in labor are likely to occur.

1. Pathological presentations.

Shoulder presentation or face and brow presentation. These occur in a goodly per cent of the cases.

2. Different presenting parts are found over the inlet. Finally, one part will descend and become engaged.

3. It may happen that the bag of waters of the second child ruptures before that of the first, or the two together. Usually no trouble. The second child is delivered more quickly after first is born.

4. In cases where one fetus presents by the breech, and the other by the head, the first may be half delivered when the second comes down, the head enters the pelvis alongside the chest of the first, and "locking" or "collision" occurs, the face of one child is pressed against the neck of the other. Occurs 1 in 90,000 cases. In rare cases nature terminates the labor. The head and body of the second child are forced out, then the head of the first is delivered. Thus we take the hint from nature. Deliver the second child first, by forceps, or cranioclasis, then the first child. It may be better to decapitate the first and then deliver the second twin.

When both present by the head the occiput of the second child may get in between the chest of the first and the sacrum and stop labor, by "locking," or "collision" by the cephalic extremities of the fetal poles.

5. The placenta of the first child is delivered before the second is born. Rarely the placenta is completely separated from the second. If the two are joined and the placenta is delivered, only the rapid delivery of the second child can save it. The accident is rare, but if partial separation of the placenta should occur, the mother is menaced by dangerous hemorrhage and the fetus with asphyxia, therefore control the heart tones of the second child.

6. It sometimes happens that the passage of the first twin alters the position of the second; sometimes from a longitudinal position

to one transverse or an anterior position to a posterior position of the occiput. Ahlfeld saw this occurrence eight times in 44 twin labors. The arm or cord may prolapse.

Prognosis.

For the mother prognosis is good. Twin labors are in the limits of Eutocia, but are near the border line; 82% of the positions are longitudinal and as a rule the mother completes the labor spontaneously. Still the prognosis is not so good as in single pregnancies, since—

1. During pregnancy the greater size of the uterus and the greater intra-abdominal tension cause albuminuria, edema and sometimes eclampsia. In a given case, absence of albuminuria may shut out twins. Tendency to nephritis is more marked.

2. Labors are longer. Uterus cannot act well on the two bodies at once, and, further, the uterine muscle is so stretched that it cannot act strongly. Danger of infection is greater and then the various operations which are made necessary by the atony uteri or the malpresentations also increase the morbidity and mortality.

3. The patient is liable to hemorrhage between the two births and especially after the third stage is over. This is from atony of the uterus, so-called uterine inertia. This increases the liability to infection during the puerperium.

4. For the child, prognosis is not good. The majority of twin births occur a few weeks before term, a large percent over four weeks. A large percent dies in the first days after labor, 20% in the first 10 days. A high per cent is still-born. It is estimated that 75% die in the first year of life. I think this is too high. This is due to the facts that first, they are often premature; second, the mother, weakened by the double pregnancy, may not have enough milk for two infants.

Treatment.

The same as in ordinary labor, "watchful expectancy." It may take a day or two (rare) for the cervix to dilate fully; patient has sometimes false pains for weeks before labor. Wait and do not rupture the bag of waters unless there is some indication.

After the first baby is born, you must watch carefully for two things:

I. Hemorrhage from the mother, external and internal.

II. Asphyxia of the child.

Stand ready to deliver the second child, and if either occurs, have somebody control the heart tones constantly. If they are normal and no hemorrhage, wait. The uterus gathers strength and after 10 to 60 minutes a new bag of waters forms. It usually ruptures early, if not it is justifiable to rupture it after 30 minutes. If

there is hemorrhage or if asphyxia, must rupture the membranes and extract at once.

The delivery of the second child is rapid, and after this carefully guard the uterus. Tie the cord of the first child in two places so that the second child does not bleed from it. The placentas generally communicate.

Regarding the delivery of the first child, the ordinary rules hold, likewise of the second. If the latter has been turned into a bad position by the first child in passing, this must be rectified. Prolapses of the cord and extremities are not uncommon with the second child, but since all the conditions are present for rapid delivery there is seldom any danger to the child, if the attendant is watchful and prepared for emergencies.

The third stage requires great attention. Massage the uterus gently right after the children are born. Have ergot and hot vaginal douche ready. If bleeding occurs get the uterus hard by massage and express the placenta by means of Credè expression.

Control the uterus fully 1½ hours after labor and always give ergot dr. 1; repeat in 30 minutes.

In 63% of the cases the children are of the same sex; in 37% of different sexes. Boys preponderate here as ordinarily.

There is usually a difference in the development of the twins. If they come from one ovum there is not so much difference; they resemble each other closely. A difference of 300 gms. in weight is common, it may be 500, seldom more. This is due to the relatively better and poorer means for getting nourishment in utero. There may be even an intra-uterine struggle for existence.

In cases of single ovum twins the placentae anastomose, and therefore the two circulations. If one heart is stronger than the other it does more work, forces the blood further in the placenta and thus uses more of the placenta than the other fetus. The heart of this fetus atrophies, and finally does no work, but receives blood from the stronger fetus and thus becomes a mere parasite. The fetus shrinks, does not develop, and becomes simply a little lump of flesh, covered with skin. This is called an Acardiacus.

If the irregular distribution of the circulation occurs later, the development of the stronger fetus pushes the weaker one against the wall of the uterus, where it is flattened out, becoming a fetus papyraceous.

It may happen that after one fetus is absorbed, or expelled in premature labor, that the other goes on developing and may be delivered at full term. Cases are rare, but authentic. It was believed that these cases were an example of the fertilization of an ovum after one was already developing in the uterus, i. e., Superfetation.

If we admit the possibility of superfetation we must admit that ovulation occurs during pregnancy. Some authorities say this oc-

curs. All the evidence is not yet obtained, but for the present we may say that superfetation is possible in the human female; recent specimens have shown that it has occurred, though it is rare.

Superfecundation is the fertilization of ova of the same ovulation by different sires; e. g., a mare covered by a stallion and a jackass, throws a foal and a mule. Bitch covered by various breeds of dogs, gives a varied litter.

A white woman may give birth to twins, one white and the other black. Still she may have copulated only with the black man. Cases are on record where the offspring resembles one parent only.

From the evidence we may say that it is possible for superfecundation to occur in the human.

TRANSVERSE PRESENTATION.

In those cases where the long axis of the fetus crosses the long axis of the mother, we speak of transverse presentation. It is rare that they cross at a right angle. Almost always the fetal axis is oblique to the axis of the mother. The head is usually the lower pole, but sometimes the breech is lower.

In certain cases the head is just a little deflected from the inlet resting in the iliac fossa; these we call "oblique" positions. The breech may also be a little to the side and that is called oblique breech position. In German they are called "abgewichene Kopf oder Steisslagen," i. e., the head has deviated from the median line.

The term oblique presentation is sometimes applied to those conditions which we call transverse presentations.

Since the shoulder is the part to enter the pelvis, is the presenting part, they are called shoulder presentations, but the back may present, also the side, or the belly. The three latter are very rare. The child may occupy the normal fetal attitude, flexion of all members and the spine, or it may be lateri-dorsi-flexed, or with the limbs displaced or twisted on a longitudinal axis, all of which complicate the diagnosis and treatment.

Causes of Transverse Presentation.

In general anything that will prevent the engagement of the head in the pelvis, also any condition conferring an extraordinary degree of mobility on the fetus, will cause transverse presentation. The cause may be primary and lie in some malformation of the maternal parts or the fetus, or secondary, being produced by some act or accident during labor.

The most important causes are:

1. Contracted pelvis. Transverse presentations occur twice as often in contracted pelves as in normal pelves. So constant is this that when called to a case of transverse presentation must think of it. May be a flat or a generally contracted, justominor pelvis or an exostosis.

2. Anything in the pelvis preventing the engagement; e. g., ovarian tumors, fibroid, the placenta, full bladder or rectum (sometimes happens that after emptying a full bladder the fetus turns of itself).

3. Twins displacing each other.

4. Multiparity, hydramnion, premature labor.

5. Uterus bicornis, uterus arcuatus, partly septate uterus.
6. Anomalies of the fetus, e. g., double monsters.

Of the secondary causes, accident plays the stronger role. The fetus happens to be in an unfavorable position when the bag of waters ruptures, the shoulder is forced into the pelvis, and a transverse presentation results. The dislocation of a second twin by the first is also to be reckoned here. Dislocation of the child by a full colpeurynter also.

Often several of these factors will combine to cause the malpresentation. In some cases the fetus seems to keep its embryonal position in utero, or the uterus is not tense enough to adapt the fetal ovoid to itself.

Positions.

Although the back or the belly may lie across the inlet, the shoulder is the part which most often enters the pelvis first, so that we usually speak of shoulder presentation, the shoulder being the presenting part. The *point of direction* is the *scapula.* The landmarks on the shoulder are the scapula, the acromion process, the *axilla* and the clavicle.

There are four positions which the fetus may occupy in utero; in three-fourths of them the back is to the front.

Scapula laeva anterior, head to left back interior. Sc. L. A.

Scapula dextra anterior, head to right, back anterior. Sc. D. A.

These are more common, are called "back anterior positions" and are much easier to deal with.

Scapula dextra posterior, head to the right, back posterior. Sc. D. P.

Scapula laeva posterior, head to the left, back posterior. Sc. L. P.

These are rarer, are called "back posterior positions," and are harder to deal with. Thus you see the position of the back and that of the head give you the points in diagnosis.

The fetus lies in utero in the ordinary flexed attitude, the chin on the sternum, arms across the chest, and legs on the abdomen. Prolapse of one arm (the lower almost invariably) frequently occurs. Occasionally both arms prolapse, and very rarely simply the upper arm. Prolapse of the cord is also not uncommon. As the labor goes on the breech comes nearer the head, the shoulder being forced down into the inlet. The child is somewhat twisted.

Diagnosis.

Usually this is not difficult.

Abdominally. (1) The ovoid is not longitudinal, but more or less transverse. This is the most important finding.

(2) There is nothing over the inlet. The hands feel the space empty, and may almost come together over the pelvis.

(3) In the fundus there is no hard part either. But there may be some extremities, or the uterus may be depressed in the middle.

(4) The back is to neither side, but one feels other things.

These are negative findings, but they generally suffice to make the diagnosis of a transverse presentation.

Scapula laeva anterior. In front will be felt the back, to the left in the flank, the head, hard, round, ballotting sometimes. To the right side under the liver, the breech with small parts. Heart tones near the navel, a little to the left.

Scapula dextra anterior, similar to the other, but transposed.

Scapula dextra posterior. Head to the right under the liver, breech and extremities in the left flank. No hard, smooth back is palpable, but the front of the abdomen is full of small parts which are felt very clearly. Heart tones, indistinct to the right and in the level of the navel.

Before the rupture of the bag of waters palpation is usually easy, but afterwards the uterus applies itself to the fetus so that it may be impossible to distinguish the parts. During pregnancy the diagnosis by abdominal palpation is usually satisfactory and the vaginal examination gives poor results, while during labor the opposite is true, since the contracting uterus covers up the abdominal findings.

Vaginally—The vault of the vagina is empty, unless some part of the fetus has prolapsed. The bag of waters hangs down in the vagina sometimes even to the vulva, and is "pudding" shaped. The cervix hangs down like a cuff. May be impossible to feel anything in the vault of the vagina, and the manipulations may rupture the membranes, *which must be avoided.* This difficulty of finding a part is suggestive of transverse presentation.

If labor has progressed for a short time the shoulder is pressed into the pelvis and the finger feels a small, roundish, uneven body. If the bag of waters is ruptured, sometimes without this we may distinguish the landmarks, which are the *axilla,* the acromion, the clavicle. In the axilla can feel the ribs, the "costal gridiron" (Pajot), the finger gets into the apex and feels the edges of the scapula on one side. The scapula may be sometimes reached, or even the spinal column. The sharp pipestem-like clavicle is sometimes palpable. All these points diagnose the shoulder.

If an arm or the elbow be prolapsed, the diagnosis is easier.

Scapula laeva anterior. The acromion process is felt to the left side in front. The axilla points to the left side, since the apex of the axilla is in the direction of the head. The finger in the axilla feels the ribs and also the anterior edge of the scapula. This point gives the position of the back, which is to the front, since the edge of the scapula is felt towards the symphysis. This is all that is needed for the diagnosis, but feel for the clavicle, which points to

the belly of the child, and here lies toward the sacrum. If possible feel the spine.

If the arm (the lower) is prolapsed, it will be *the right arm* in scapula laeva anterior; you will be able to shake hands. If the fetus be alive, and therefore have the rigidity of its joints preserved, the arm will give you the points necessary for the diagnosis of the position. Thus the palm will be on the side where the belly is, i. e., toward the sacrum, the thumb will point to the head, the elbow will point to the back; but it is better to follow up the arm to the axilla and get the points in diagnosis from here.

Scapula dextra anterior. The points are the same, but transposed; the left arm of the baby prolapses.

In Scapula dextra posterior the apex of the axilla points to right. The edge of the scapula is found towards the sacrum, and sometimes it is possible to feel the spine, near the sacrum. The clavicle is in front, the scapula behind.

The right arm prolapses, the thumb is directed to the right side (the head), the elbow points to the left side.

In Scapula laeva posterior points the same, but transposed; the left arm prolapses.

Therefore in scapula laeva anterior and scapula dextra posterior the right arm prolapses, and having determined this, need only one point more to complete the diagnosis, e. g., the side to which the head is. If the right arm is in the vulva and the head to the left, it is scapula laeva anterior. If the right arm is in the vulva and the head to the right, scapula dextra posterior.

After labor has progressed to a great extent, the vaginal findings are made indistinct by the swelling of the parts. The shoulder becomes wedged into the pelvis and this with the swelling makes the landmarks hard to find, therefore the advantage of an early diagnosis.

The arm may be so swollen that it blocks the vagina and then it becomes dark blue, suggillated and sometimes gangrenous.

After the baby is pressed together and forced into the pelvis the diagnosis may be impossible, unless an arm has prolapsed. When the back or belly is placed across the inlet the diagnosis is generally more difficult. Skillful men have made mistakes, therefore be warned to care.

Clinical Course of Transverse Presentation.

These cases are all pathological. True they sometimes terminate spontaneously, but the fetus almost always dies and very often the mother too, so that they are dystocia and always need the intervention of art.

Early in pregnancy it is common and even in the latter weeks,

occasionally we find the fetus in a transverse position. This almost always corrects itself in the few weeks before labor. This process, of which the accoucheur in the majority of cases knows nothing, is called *self-rectification.*

It does not mean that the fetus puts itself into a longitudinal position, but that it finally is brought to a proper position by the uterine contractions. This process may be aided by the proper position of the mother. If it does not take place during pregnancy, a longitudinal presentation may be brought about spontaneously during the first stage of labor, or even at the beginning of the second stage (very rarely). This is called *"spontaneous version";* is not at all a constant occurrence and in practice is *never relied on.*

It is especially likely to occur in hydramnion. Occurs sometimes, but not so common, in contracted pelvis.

If neither of these occurs, the transverse presentation persists, and unless aid is rendered the labor with its evil results proceeds. We find transverse presentation during labor in seven-tenths of the cases; just a little more frequently than face presentation (6/10%).

In order to study the mechanism of transverse presentation we will take a case where no aid is rendered. The pains are likely to be slow and weak, since no hard part presses on the cervix. But the bag of waters often ruptures early. The lower uterine segment is not cut off from the general cavity of the uterus, so after the rupture of the bag of waters all the liquor amnii escapes, since there is nothing to hinder it.

This is a bad accident, especially if the cervix be undilated.

When the uterus has no more liquor amnii the walls apply themselves to the fetus very closely. Two conditions may now be observed; first, there may be no pains at all, the uterus simply lying opposed to the fetus, in a condition which was called by Kilian "passive contraction." (See Muller's Handbuch, p. 756, Vol. II.) The walls are distensible, the hand can be easily introduced and even version preformed. This condition carries no danger to the fetus or mother, may last a few days, but generally passes over into the other state, either spontaneously or as the result of brisk manipulations.

This first condition has nothing to do with the so-called tetanus uteri, to be described later.

Sooner or later, usually the result of improper treatment, the pains begin, and very soon acquire a dangerous violence. They force the shoulder into the pelvis, the fetus is folded together, the breech nears the head.

If the fetus is small or macerated, and the pelvis large enough the uterus, aided by powerful efforts of the mother, may succeed in expelling it. This is called "spontaneous evolution," and is the last, least likely, and most dangerous method nature has of over-

coming the mal-presentation. There are two methods of spontaneous evolution:

1. The shoulder becomes fixed, the side of the neck, being arrested at the linea innominata, the side of the chest is forced down alongside the shoulder, then the breech comes down alongside the chest, finally the breech is delivered. Now follow the shoulders, then the head. The baby is rolled by the shoulder.

2. The baby is folded together, the head is forced into the chest and abdomen, and it is delivered thus, in "*conduplicato corpore.*"

In both these methods only a small child can be expelled, and more likely by the first. Only one or two cases are on record where the child was saved. The baby dies of compression or from the interruption of the placental circulation, as a result of the continuous uterine contractions. These terminations are not to be relied on in practice.

If the fetus is the normal size, the case takes a more serious aspect. The pains become irregular, tumultuous, the distinction between pain and pause is not marked, the uterus is in a state of constant contraction. The patient becomes anxious, complains of continual pain, great tenderness over the lower part of the uterus, pulse and temperature begin to go up. The uterus draws up over the child, the muscle becomes thick above the contraction ring; the lower uterine segment is thinned out, till it is as thin as a blotter, and here the uterus is *likely to rupture.*

This condition is called a "*Neglected transverse presentation*" and the uterus is in a condition of threatened rupture. The difference between the fundus and the lower uterine segment with the thinned and dilated cervix, can be seen and felt on the abdomen by a groove, running from side to side about the level of the navel. Above this groove the parts can be poorly felt, below this groove the fetus is easily felt. Unless aid is given the uterus ruptures and the mother dies of shock, hemorrhage, or sepsis, from peritonitis. The uterus may rupture during an attempt at version. The fetus is usually dead, from the interruption of the placental circulation and from compression. If not, it dies after the rupture, and may be in part or in toto extruded through the rent into the abdominal cavity. Or the woman may die of shock and exhaustion before the rupture.

If the uterus should not rupture soon, and the tendency varies with different women (in primiparae not so much tendency as multiparae), the pains get weaker, irregular, the cavity of the uterus becomes infected, either from the vagina, from the air, from the exposed arm or from the examining fingers; the fetus and the little liquor amnii left, begin to decompose; gas is developed in the uterus and distends it. The condition is called Tympani uteri or Physometra. The patient is soon affected by the sepsis. Tempera-

ture goes up, pulse also, rapidly, features change, subicterus, and the poor woman dies with symptoms of acute septicemia.

Another condition that occurs, as well with cephalic presentation as with transverse presentation, is called *Tetanus Uteri.* It is due to too early, brusque and unnecessary manipulations of the uterus or cervix, and especially to the administration of *Ergot.* The uterus is in one continual spasm. Occasionally a pain will increase the spasm. You find the uterus hard all over, very tender, in continual pain; the cervix is red, dry and hot; the vagina also dry and hot; there is no secretion.

Labor is brought to a standstill, since in this condition the cervix will not dilate, and it is generally impossible to turn the baby so as to extract it. There is no danger of spontaneous rupture, but the baby dies, due to the interruption of the placental circulation, and unless something is done, the mother dies of sepsis. Treatment consists of giving ChCl3 and hot baths, to relieve the spasm, then version and extraction.

Fortunately, in this country, and also in Europe, cases of "neglected transverse presentations" are becoming rare, almost unknown; but the evil results of neglect must emphasize the importance of early diagnosis and consistent treatment.

Prognosis.

This depends on early diagnosis and the attendant, or, in other words, on the ease and safety with which the version can be performed. If it is possible to bring the head over the inlet during the latter weeks of pregnancy, the prognosis is the same as usual.

If during labor you can bring the child into a longitudinal position, the prognosis is only slightly worse than the longitudinal position usually gives. The danger of the operation must be added to this.

In cases where the uterus is threatened with rupture, or has already begun to tear, the prognosis is very bad. Almost always the fetus is dead, and the mother frequently is lost, also. Such conditions are among the worst that confront the accoucheur.

Treatment.

Version, *not* watchful expectancy. During pregnancy, if the condition is recognized, try version by posture. Have the woman, when in bed, sleep on the side to which the head points, e. g., Scapula laeva anterior, on the left side. Keep this up for two to three weeks. No hurry, there is no danger of premature labor. After the position is longitudinal place a suitable binder with pads on either side. In France, a girdle called "ceinture eutocique" is much

used. My experience with this method is not encouraging, the pads with binder becoming loose, but often the position rectifies itself.

If found just before labor and posture has not succeeded, perform version by external manipulation. Press the head over the inlet and pull the breech in the opposite direction. Then apply the pads and binder.

During the first stage of labor, version by external manipulation, aided by posture. Put the woman to sleep if necessary, and persist with the version till it is completed. After bringing the head over inlet force it down, or rupture the bag of waters. (More next year.)

If the case is one of "neglected transverse presentation" you must do version by introducing the whole hand into the uterus under anesthesia. A foot is brought down at the same time that the head is pushed up. The danger in these cases is that you might bring the breech and the shoulder into the lower uterine segment at the same time and thus rupture of the already thinned muscle (uterine muscle) is almost certain.

In these cases where version is impossible or is contraindicated by the condition of the uterus, we have alternatives. If the fetus lives, Caesarean Section; if dead, embryotomy.

ERRORS IN THE ATTITUDE OF THE FETUS.

I. *Displacements of the Extremities.*

Prolapse of the hand with the head, occurs 1 in 225 labors. We speak of prolapse when the arm has really come to lie before the head.

In these cases where the hand is felt alongside the head inside the bag of waters, we speak of it as "forelying." These latter cases are not uncommon in the early part of labor. Usually the arm is withdrawn in the course of the case and no trouble results.

Sometimes in a normal delivery you find the hand comes out alongside the head, having exerted no influence on the labor, or for some delay in the second stage an examination shows a prolapsed arm.

The anterior or posterior arm may come down. If the anterior, there is more likely to be trouble, since then it gets in the way of the anterior rotation of the occiput. If the posterior, it favors the rotation of the occiput, by getting between the head and the inclined planes of the pelvis. A rare condition mentioned by Simpson, is where one or two arms lie in the nape of the neck. They form almost insuperable obstacles to labor, are hard to diagnose and very hard to treat. Fortunately, they are rare. Sometimes both arms prolapse. Or one hand and a foot.

Pernice, in 2,891 labors, in Halle:

Hand and arm with the head,	34 times,	Two feet and one hand	1.
Hand and the cord,	5 times.	Two hands, cord,	
Both hands,	4 times.	One foot,	1.
Foot and hand,	2 times.	Face, hand and cord,	1.

Causes.

I. Anything that will prevent the engagement of the presenting part, e. g., contracted pelvis, tumors, etc., in the pelvis.

II. Anything that allows the lower uterine segment to be incompletely filled, e. g., face presentation, small child, multiparity. Dead children not seldom predisposed to prolapse because there is no tonus in the extremity.

III. Accident. (a) Sudden rush of waters carries the arm with it. (b) Dislocation by the passage of the first twin. Clinically, prolapse of the arms may form an obstacle to labor. The head may be prevented from engaging or even a transverse presentation be brought about. They may increase the tendency to rupture of the perineum, by increasing the circumference of the presenting part. By keeping a space alongside the head they favor the prolapse of the cord. Labor is likely to be slower and art is needed oftener.

Diagnosis. Simple, if the extremity is low down, but sometimes it is high up and may be an obstruction to labor. Then diagnosis is hard.

Treatment. If recognized before the bag of waters ruptures, posture. Put the woman on the side to which the hand is *not* prolapsed. If, after rupture and the arm seems to prevent the head from getting into the pelvis, replace with the half hand.

If, after the head has gotten into the pelvis, leave to nature, since it has been shown that there is enough room for both head and arm. Forceps operations are much more frequent when the arm prolapses, since it increases the volume of the presenting part. In applying the instrument be sure not to grasp the extremity in the blades.

Treatment of the prolapse of the two arms the same.

2. *Prolapse of the feet with the head.*

This is much rarer. It usually does not cause dystocia, but may do so. The feet may prevent the engagement of the head. If the head will not engage in the inlet reposition of the foot is indicated. If this is impossible you must do version by the feet, which is usually very difficult, in spite of the fact that the feet are already near the head and over the inlet.

If the foot has come into the pelvis alongside the head, no treatment, but watchful expectancy and forceps for pathological delay in the 2nd stage.

Prolapse of the arm in shoulder presentations and of the foot in

breech presentation (another way of stating footling presentation), already mentioned:

Prolapse of the Cord.

This is very rare. Occurs 1 in 400 cases, but the statistics vary very much, some authors giving 1 to 100, 1 to 800, etc.

Causes. The same as for prolapse of the extremities.

1. Obstruction to engagement of the presenting part.
   a. Contracted pelvis, so frequently a cause, that the first thing one thinks of when a case comes up is, contracted pelvis. In primiparæ with prolapse of the cord, contracted pelvis almost always.
   b. Tumors of the pelvis, etc.

2. Mal-adaptation of the presenting part to the lower uterine segment, e. g., multiparæ with lax lower uterine segment. Face presentation, breech presentation, and especially shoulder presentation.

3. Accident. Sudden rupture of the bag of waters. Delivery of 1st twin may allow it to prolapse in the second.

4. Low specific gravity of the liquor amnii (?).

Other causes are, unusually long cord, but, then, very few cords are too short to prolapse; velamentous or marginal insertion of the cord with the insertion at the lower end of the placenta.

Here we have the same divisions of the cases:

"Forelying" cord when the cord is lying in front of the presenting part, still in the bag of waters.

"Prolapse" when the bag of waters has ruptured and the cord is in the vagina or in the vulva. In some cases the loop may project 6 or more inches from the vulva.

The course of labor for the mother is not any different than that of the accident which causes the complication. For the fetus it is dangerous, as almost always it dies if the case is left to nature.

Diagnosis.

Before the bag of waters ruptures one sometimes feels a pulsating coil inside the membranes. Distinguished from pulsating arteries in the fornices by the count and by the position, they are inside the cervix and membranes. A small loop off to the side of the head high up may and generally is, in the ordinary examinations, not noticed unless some of the signs of fetal asphyxia draw attention to the possibility of the condition, e. g., irregular heart tones, and no obvious cause for it. Differentiate velamentous insertion of cord.

After rupture of the bag of waters the diagnosis is easy, usually. The pulsating cord can be felt in the cervix, or in the vagina, or even be seen outside the vulva.

In the slowing of the heart tones and the discharge of liquor amnii with meconium (symptoms of intra-uterine asphyxia), we have other signs which aid the diagnosis.

Prognosis.

Bad for the child, 95% die if case is left to nature; 50% die even with good treatment. All depends on the cervix, *i. e.*, the rapidity with which the child can be delivered.

Mother's prognosis depends solely on the operations necessary to save the child. Otherwise, it is the same as that of the position in which the child is found. If the case is left to nature, the prognosis with reference to the mother is as usual.

Treatment.

Before rupture of the bag of waters, posture. Place her to the side where the cord is not. After rupture, if the cervix will admit the hand, two methods, replace the cord, or version and extraction. After rupture but before the cervix will admit the hand, version by means of two fingers in the uterus and the other hand outside. Braxton-Hicks. Version or replace the cord with a catheter. After the head has engaged in the pelvis, forceps if the child lives, embryotomy in primiparæ, if the child is dead. In multiparæ, leave the case to nature. More later.

LACERATIONS OF THE PERINEUM.

There are three grades or degrees of perineal tears usually recognized:

I. When the tear extends through the frenulum and one-third the way to the anus.

II. When the tear extends to the sphincter ani.

III. Through the sphincter, and upward through the recto-vaginal septum, or toward the coccyx.

The first two are called incomplete, the 3rd complete, perineal tears.

Tears of the first and second degree occur in primiparæ in about 15% of the cases; tears of the frenulum alone in about 39%. (Schroeder.) My experience the percentages are greater.

Tears occur more often (1) in primiparæ, especially old; (2) in multiparæ, who have been torn before; (3) where the perineum is pathologically altered, e. g., syphilis, fat, edema; (4) where large diameters of the fetus are offered, e. g., posterior rotation of the occiput, brow presentation or where the head comes through too quickly, as in breech cases; (5) in operations, e. g., extraction by the breech. Sometimes the hand may rupture the perineum, or the forceps operation; (6) cases of narrow pubic arch; (7) too small

pelvic inclination; (8) delivery on the back; (9) too broad shoulders or carelessness in the delivery of the same.

The shoulders may tear the perineum, or they may enlarge a small tear started by the head.

Complete perineal tears are rare, they almost never occur with normal head presentation; are most common with breech deliveries, particularly in manual extraction and in forceps deliveries, especially the high forceps. These are almost always errors of art, still have in rare instances occurred in the best hands.

The tear generally begins in the vagina, on one or the other side of the columna rugarum, sometimes on both sides; then it extends out to the edge of the vagina, now the edge of the posterior commissure begins to give way and the tear extends down through towards the anus. If it should go further, the sphincter ani is torn and the rectum opened, the septum between the vagina and rectum is torn to a variable degree.

In some cases the tear begins in the skin at the edge of the frenulum, and then the perineum splits in the median line; these cases are usually not great and are easy to sew up.

In a tear of the first degree the frenulum and constrictor vulvæ are involved. The outlet of the vagina is also torn to a small extent.

In a tear of the second degree the same muscles, plus the transverse perinei, the lower fibres of the levator ani and the bulbo cavernosi. The wound extends up into the vagina generally to one side of the columna rugarum.

The sphincter ani is seen crossing the bottom of the wound as a pinkish, yellow band about three-fourths inch wide and one-eighth inch thick. It can be recognized by the transverse fibres. At the sides are the muscles mentioned and one can see them twitching up and down. The hemorrhages are usually mild but sometimes large veins may be torn or, rarely, an artery. In the vagina the columna is pulled to one side and is retracted upward if the tear extends on either side. These tears are Y-shaped with a bend in the Y at the point of division, thus seen in vertical section.

The tissues are soft, tear easily and are suggillated. At the edge of the wound there are small tags of skin or mucous membrane. It may be difficult to distinguish torn surface from the bruised vagina, they are so dark and purple.

In a tear of the 3rd degree, the same appearances but exaggerated. The sphincter cannot be seen, but the posterior wall of the rectum and anus is visible. To each side can be seen the retracted ends of the sphincter, higher up toward the vagina the torn muscles which made up the perineal body. In the middle, high up in the vagina, can be seen the edge of the vagino-rectal septum. Feces escape uncontrolled and make the wound very dirty.

Clinical importance, of perineal tears, is great, aside from the danger of prolapse of the vagina and uterus, later, perineal tears are likely to become infected and may cause severe forms of sepsis.

In the complete tears the incontinence of the feces is an awful accident, often forcing the woman to social ostracism.

Diagnosis, usually easy. Get a good light, wash blood off with 1% lysol, clean hands. Two pledgets of gauze, separate the labia fully.

If deep the sterile finger may be passed up into the vagina and can feel the extent (this after considerable practice). If blood obscures the view, pass a pledget of gauze up into the vagina.

Examine every case of labor for injury to perineum.

Treatment.

If the tear is more than one-half inch deep it must be repaired. Tears of less than one-half inch may be left to nature.

If of the first degree, the suturing may usually be done from the perineum.

Must have round, full curved needles, a needle holder, a few artery forceps, suture material. Of these the best is silk-worm gut. For severe tears have 2 vulsella, 6 and 8 inch art. forceps, large specula, with long handles, and plenty of assistants.

For ordinary tears often have to operate alone, but if a serious tear take time, get assistants and go slowly.

Patient on a table. For a few sutures no anesthetic is necessary, since the parts are so bruised that there is little feeling in them. Tear of first degree.

May begin from below or above. Put the needle in one-fourth of an inch from the skin edge, sink it well to the sides of the perineum; let it come well towards the vagina and bring it out on the opposite side in the same way.

Place the sutures three-eighths of an inch apart.

Put them all in before tying. Tie from below upward, tightly, because after the swelling goes down they may not be united. After being tied, tie the ends all in one knot, one inch from the vulva, and cut close to the single knot.

During the operation use sterile or bichloride gauze for sponges, sterilized water or weak antiseptic for solution.

When the 2nd degree of a tear occurs, the same general rules obtain as with the smaller tears. Table, good light, instruments and silkworm gut.

Here it is necessary to make two rows of sutures. One from the vagina and one in the perineum. A ball of gauze is passed high up in the vagina and then the parts carefully inspected. With the fingers adapt the sides of the wound to each other. See if the tear runs to one or both sides of the columna, and how far. Begin suturing from the top corner. May pass the finger into the rectum, covered by a rubber cot. Place the stitches ⅜ inch apart in the vagina. May tie as you go along, but if there is doubt as to how the edges will come together, leave untied. Three to eight vaginal sutures may be necessary.

The suture enters the mucous membrane near the edge, goes not very deeply in the median line, but at the sides where the levator ani has retracted, the needle goes deeply so as to catch these fibres and bring the torn ends of the muscle together.

If the wound is deep here, it may be advisable to unite the pelvic floor with buried catgut sutures and then suture the vagina. If the tear is only on one side, now suture the perineum as before. If on two sides, place two rows of sutures, from the vagina, then sew the perineum.

Now put in crown suture, taking in skin and vaginal surfaces. If the levator ani is torn from its attachment to the walls of the pelvis, it cannot be repaired by suture.

When the tear extends through the anus the operation is much more difficult.

Pack rectum after lavage, and also vagina. Three rows of sutures, one in the rectum, which tie on the rectal mucous membrane; one in the vagina, and one in the perineum.

Take plenty of time. Must bring the sphincter together; therefore, pass the needle deep in the sides. Best to suture the sphincter separately with catgut. It is retracted upward and to the side, and the two ends must be brought together so as to give control of the feces. Place a deep reinforcing suture opposite the suture uniting the sphincter ends. Do not forget to remove the rectal or vaginal packing.

After Treatment. Not necessary to tie the legs together.

Every 5 hours, and after every bowel movement and urination let a pint of 1/3000 $HgCl_2$ run over the vulva, but allow no washing with cotton or sponges. Not unusual for a little odor to the lochia, but do not mind this unless very bad. If the odor is annoying, see if there are decomposing blood clots in the uterus and vagina or other evidences of infection, and if the case is infected the stitches

must be removed, and the proper treatment instituted. (See Senior Notes.)

On the tenth day remove the sutures. Same precautions as usual. In cases of complete laceration give liquid diet for the first few days, so that there is no bowel movement. Do not give opium for this purpose. Before the bowel movement, which may be attained with castor oil on the 3rd day, inject oz. 2 of warm oil into the rectum. Immediately after, wash the parts with 1/2000 bichloride solution.

In general, vaginal injections not to be prescribed. After all perineal tears, patient must lie in bed longer, certainly 2 days after sutures removed, and in complete tears fully a week, and always procure a soft bowel movement, so that the sutures do not tear out and the newly healed wound break open.

Tears of the Vestibule and Clitoris.

These are sometimes deep and then may cause bleeding. They are due to too strong pressure of the head upward against the rami pubis, or too sharply bending the forceps up. Owing to the softness of the tissues it may be impossible to tie the vessel, therefore pass a suture under it and tie or sew up the wound with deep-laid mattress sutures.

Bleeding from these cases may be considered post partum hemorrhage from the uterus unless a local examination be made.

PHYSIOLOGY OF THE PUERPERIUM.

After the birth of the child and placenta the woman is a puerpera, the puerperal state has begun.

The puerperium may be defined as that period which extends from the delivery of the ovum till the return of the genitalia to the non-pregnant condition is complete. Its length, therefore, is from 6 to 8 weeks, but in common usage the puerperium means the time the woman is in bed after the labor. This is not a good way of considering the puerperium, since the woman may get up on the third day, and in the Indian tribes she may not go to bed at all.

The distinction between normal and pathological conditions during the puerperium is not easy, even with the aid of the thermometer and of bacteriology. The rapid disintegration of the uterus, the changes in the endometrium, and in the open vessels at the placental site, are closely akin to the pathological, and would be called such if they occurred at any other time or place.

It is the same approach to the abnormal that renders permanent structural changes so prone to begin during the puerperal period. After the emptying of the uterus, changes in the uterus and adnexae are inaugurated which will finally bring them to their former condition. The circulation in the pelvis, which has been so full during pregnancy, now retrogresses, the blood being determined to other parts of the body. The breasts undergo progressive changes and for the next nine months complete the work begun by the uterus. In the study of the processes of the puerperium we have to consider, 1st, the changes in the uterus and genitalia; 2nd, the changes in mammae. These are local changes. 3rd, we have the general changes, e. g., lungs, heart, skin, kidneys, etc.

Regressive Changes in the Uterus, or Involution.

Immediately after labor the uterus is at the level of the umbilicus, sometimes a little above it. The shape of the uterus is like a pear with the corners squared off. The uterus is situated in the median line, but it is likely to be deflected to the side, almost always the right, if the bladder or rectum be filled. The uterus is in a state of anteflexion and anteversion; it lies against the abdominal wall, resting against the promontory of the sacrum behind.

The walls of the uterus which, before labor, were 4 to 6 mm. thick, now are 4 to 5 cm. thick, and a little thinner where the placenta was situated. (See Fehling, p. 5.) The lower uterine seg-

ment lies folded somewhat together. The internal os or the contracting ring of Bandl can be felt. On each side the broad and round ligaments hang down loosely.

The uterus is in a state of *retraction*. The tonicity of its muscle is developed. Every 5 or 10 minutes a contraction occurs and passes away. A continual contraction, which Ahlfeld believes, does not exist. It is unphysiological; further, one can feel the uterus relax and contract.

The sinuses of the placental site are partly filled with clots. These do not, in normal cases, extend far into the veins but simply on the surface and to some depth. If the thrombosis extends beyond the uterine wall the case is pathological. If no thrombosis occurs the case is also pathological, though bleeding does not necessarily occur.

The walls of the uterus lie flat on each other, or there may be, especially in multiparae, a clot of varying size between them, so that ordinarily the uterus has no lumen.

The uterus is about the size of a fetal head and weighs 2 lbs. This varies somewhat with the size of the woman, the dilatation of the uterus, etc.

One sometimes observes, in the first 12 hours after labor, an apparent increase in size of the uterus. This is due (normally, of course), not to hemorrhage, but to the full bladder (urine accumulates rapidly since the tension is removed from the renal vessels). The tonus of the parts reappears quickly, and the uterus, which sometimes sinks so low in the 3rd stage that the cervix becomes visible, rises up higher in the abdomen. From now on the uterus grows smaller, the fundus sinks towards the pelvis. This can be measured every day with a tape, but the rule of the fingers is good enough for practical purposes. The information is of little value unless qualified.

The decrease in size of the uterus begins in the first 12 hours, and is regular till the 10th day, when it is lower. Any irregularity is due usually to some pathological condition. From the following table you can see the size of the uterus, from measurements from the top of the uterus to the pubis:

1st day, 14.5 cm.	5th day, 9.1	9th day, 6.5.
2nd day, 12.4 cm.	6th day, 8.3	10th day, 5.9
3rd day, 10.8 cm.	7th day, 7.7	11th day, 5.5
4th day, 9.8 cm.	8th day, 7.0	12th day, 5.1

These measurements were taken when the bladder and rectum were empty and when the uterus was held up against the abdominal wall, *i. e.*, the anteflexion corrected.

In practice the fundus uteri sinks below the pubis, or the inlet, on the 12th day, so that from external palpation it cannot be felt. On

the 5th day after labor the uterus is 4 to 5 fingers from the pubis. After this, it sinks one finger-breadth every two days.

In women who do not nurse their babies, the involution of the uterus is slower, and in cases of sepsis the involution may be arrested or slowed.

The rapidity of the decrease in the size of the uterus varies in different women, in the same woman at different confinements, and the rate of decrease is not even, the most occurring in the first 6 days, when the uterus loses half its weight. At the eighth week the uterus may be even smaller than the virgin uterus, and if the nursing is continued actual atrophy of the uterus may occur. If there are no general symptoms, e. g., pain in the back, nervous disturbances, anemia, weakness, and if the uterus does not grow too small, the condition is not abnormal and the uterus will regain its size after the lactation ceases.

The changes in lower uterine segment are less known. Immediately after labor the cervix hangs in the vagina as a thick, soft cuff, more or less torn at the edges. The external os also can usually be felt. The cervical canal is large, the walls not so easily felt. All the parts are soft, almost like jelly. This serous infiltration of the parts disappears very rapidly, even after 12 hours the cervix begins to form: it shortens, becomes harder. On the 3rd day it will still allow the finger to pass, on the 10th day no longer. On the 14th day the finger reaches nearly to the internal os, and in the 4th week the cervix canal is a small transverse slit.

The whole uterus which weighed 1,000 gms. (2 1-5 lbs.) on the day of labor, on the 7th day weighs 500 gms., on the 14th day 350, and in the 8th week 60 gms.

The cause of the diminution of the size of the uterus is the changes in the muscular fibres. These undergo a fatty degeneration and absorption. Whether the protoplasm alone disappears, the cell membrane remaining, or whether the whole muscle cell degenerates, is not certain. We also do not know whether during pregnancy there is an increase in the number of cells or simply a hypertrophy of those already existing. This fatty degeneration of the albuminoid constituents of the muscle fibres is due to the anemia which exists in the retracted uterus and the venous thrombosis. This fatty degeneration begins even in the 3rd stage, and possibly in the 2nd stage of labor. It proceeds very rapidly.

The blood vessels of the uterus take part in the involution and become thrombotic, or contract, connective tissue develops in their interior, the tunica media is fatty and the vessels thus become obliterated. The process must be well advanced by the 5th day, since hemorrhages from the uterus are so rare after this time. The placental site takes longer to return to normal than the rest of the uterus. It contains sinuses filled with clots and can be recognized

thus: the clots feel like little lumps in the surface of the uterine wall. The site of the placenta in the 2nd week can be felt as a prominent rough place, the size of a quarter.

The changes in the serosa of the uterus are not so marked. After the labor the peritoneum, though very elastic, cannot accommodate itself to the uterus. It lies, therefore, in folds. These have a distinctive grouping, e. g., (Matth. Duncan). After a few days these wrinkles disappear.

Very important changes go on in the Endometrium.

After labor it is 2 to 5 mm. thick. The decidua or endometrium is covered with blood, and the top layer, the cellular layer, is lost. It has been taken away on the ovum, the placenta and membranes. In forced deliveries of the placenta, the cellular layer may be in part retained. Generally, however the separation occurs in the ampullary layer, and the surface is raw, the glands being torn and opened. The septae covered with their cubical epithelium now necrose to a large extent, and most of the glandular layer becomes fatty, degenerated and cast off. From the deeper parts of the glands which grow closer together as the uterus contracts, regeneration takes place, till at the end of two weeks, epithelium covers the septae, which have grown up and the glands have been formed. Thus, you see, the larger part of the endometrium is cast off, regeneration taking place from the connective tissue basis of the mucous membrane, and from the epithelium of the deepest portions of the utricular glands.

All these processes connected with the return of the uterus to its non-pregnant condition are called *Involution*. What becomes of these dead tissues? The fat molecules from the uterine muscles are absorbed in the usual way, probably leucocytosis. May be by means of fat-splitting and fat-dissolving ferments.

The necrotic layers of decidua are cast off by exfoliation, and appear in the discharges from the uterus, the Lochia. The bloody oozing which occurs after labor, at first pure, later becomes mixed with lymph, and is exudation from the torn surfaces of the endometrium.

The discharge from the genitalia of the puerpera is called the lochia, and stands in close relation with the changes going on in the endometrium.

The quality of the lochia varies from day to day, depending at

first upon the admixture of blood, and later upon the greater or less number of white cells present.

On the first day, seldom any longer, the lochia are almost pure blood, Lochia Cruenta or Rubra. The presence of clots is pathologic, though not necessarily dangerous.

From now on serum is mixed with the blood, the discharge is watery, stained with blood, Lochia Sanguinolenta. This lasts two to three days, and gradually the discharges become thicker, of a crushed strawberry color and creamy consistency, but the blood does not entirely disappear till the 8th or 9th day, and the discharge may again be stained with blood when the patient gets up. It is not rare to see women with a little bloody flow for three or four weeks after labor, and yet be perfectly healthy. The lochia sanguinolenta becomes Lochia Serosa about the 5th day, and stain the napkin a yellowish color; the edge may be brown from blood. There is a slight disagreeable odor and the vulva is usually a little irritated, red.

The odor of the lochia may be a faded, insipid, or be strong, even very fetid, so that the air of the room is tainted. The former variations are due to the peculiarities of the patient, the latter to infection of the genital tract with saprophytic germs. No importance is to be attached to fetid lochia unless there are general symptoms, or there is reason to believe that clots or secundines are retained in the parturient canal.

The lochia serosa get whiter, finally yellowish from the admixture of white blood corpuscles, and are now called Lochia Alba, or Purulenta. If there are any cervical or vaginal tears the number of pus cells is much greater, lochia serosa occur earlier. Microscopically. Lochia cruenta contain blood, a few very small clots and shreds of decidua. Lochia sanguinolenta, the blood coloring matter in a state of solution, red and white blood corpuscles, shreds of decidua, micro-organisms of many kinds.

The lochia serosa are full of decidual cells, large mononucleated, irregular, round or spindle-shaped cells, white blood cells, debris, cylindrical and flat epithelium, cholesterin crystals, the trichomonas vaginalis and *micro-organisms*. These exist in enormous numbers and, according to Kehrer, even in normal cases, there are pathological germs. Kehrer vaccinated women on the thigh with their own lochia and got abscesses of greater or less extent. He innoculated animals with the lochia of normal puerperæ and in many cases produced sepsis, and death. Doederlein produced the same results, but found that the lochia as they come from the uterus were without bacteria and not infectious, but as soon as they got into the vagina all sorts of germs developed. Streptococci, staphylococci, have been found and all sorts of saprophytes.

The number and virulence of the germs and, therefore, of the

lochia, increase up to the 7th day and then grow less. If these observations are true, why does not every woman have fever in puerperium?

I. Because the germs do not develop till the wounds are adherent or covered with granulations, or do not develop their virulence.

II. The uterus, where the greatest wounds lie, is free from germs in normal cases, and the stream of the lochia would tend to wash them out.

III. The women possess a varying degree of immunity from infection. This immunity may be temporarily suspended from anemia, or any severe illness, e. g., eclampsia.

The lochia alba, or purulenta, contain immense numbers of pus cells, of micro-organisms, vaginal and cervical epithelium, a few decidual cells and debris; occasionally a red blood corpuscle, and there may also be ciliated columnar epithelium.

The Quantity of the Lochia.

The amount of the lochia has been estimated for the first 10 days to be 1,350 to 1,400 grams for primiparæ, and 450 to 475 for multiparæ. Three-fourths of this is of the first 4 days.

In women who do not nurse their babies, the amount is greater, and in them involution in general is slower, the lochial discharge longer. After operation lochia are greater in amount. Women who usually have menorrhagia also have a large quantity of lochia, and too hearty meat diet, as well as alcoholics, increase the amount. Also mental excitement. A strong, robust woman is likely to have the lochia cease earlier than a weak, anemic woman, because in the former reparative processes are more rapid. In the latter, fluor albus is likely to continue for a long time, thus reducing more an already weak system.

Source of Lochia.

Sometimes compared with a wound secretion, and this applies only in part. There is sero-bloody exudate from the placental site and also the general endometrium, and from the various tears in the cervix. A large part of the flow comes from the glands of the cervix, and the vagina, so that the lochia, as they appear, are very complex. The secretion of the vulvar glands is also mixed in. In order to get pure uterine lochia, it is necessary to wash out the vagina and insert a tube through a speculum, into the cervix. The lochia are neutral or alkaline in reaction. In the second week they become acid.

Changes in the Vagina and External Genitalia.

After labor the vagina regains rapidly its tonicity and contracts. The rugæ never become so prominent as they were. The

mucous membrane is bruised, infiltrated with small hemorrhages, some of which are submucous, due to tearing of the connective tissue. The epithelium is rubbed off in places and there are, especially in primiparæ, numerous fine tears in the surface. Particularly near the vulvar orifice do we find longitudinal wounds of greater or less depth and length. These almost always heal by primary union. The fluid exuded is absorbed, the blood extravasations also, and the dark livid color of the vagina becomes red.

After a week the color fades and gives way gradually to the normal. It is rare for vaginal tears, even though they are large, not to heal. If they become infected or are torn open after being united by lymph, they granulate up from the bottom and leave hard scars; this is especially true of the fornix tears, extensions from the lateral cervical tears.

After labor there is some prolapse of the anterior and posterior vaginal walls. This rapidly disappears unless the bladder and rectum are allowed to fill.

The elasticity of the perineum is re-established with surprising rapidity. The swelling of the external genitalia goes down very quickly, and the great diminution in the size of the vulvar opening is striking. Thus perineal tears, which immediately after labor looked large and deep, after 12 to 18 hours are much smaller, but they are just as important.

In primiparæ, tears of the fourchette and around the clitoris are very common. There may be minute, three-cornered tears in the labia minora, or the crura clitoridis may be torn and give rise to hemorrhage. These tears are greater on that side to which the occiput pointed. Why?

These wounds look at first like any bruised tear, but soon they become covered with a layer of whitish lymph, which becomes opaque and yellowish with little reddish specks. The wound acts like any wound exposed to the air. There is a *superficial infection* and *necrosis*. It is wrong to call these diphtheritic exudations. On the 3rd to the 5th day a layer of granulations appears and the wound is granulating nicely by the 7th day.

Abnormal wound repair indicates a diseased process somewhere in the genito-urinary tract, and may be used for the diagnosis of sepsis.

If there is a perineal tear, and it be small, it may unite by primary union, or it may granulate up from the bottom. From the position of these tears with the lochia flowing over them continually and so near the anus, infection is very likely to take place. Parametritis, etc., in puerperio is twice as frequent with perineal tears. The union of the perineum is not firm until after the 14th day, and even later the union may give way.

Occasionally, on the 2nd to 4th days, the labia swell and be-

come edematous, especially if any sutures have been placed. This goes down under antiseptic washes; a slight vulvitis, more often if the woman is fat or the case not aseptic.

The external genitalia are left more gaping than before labor, the anterior vaginal wall being often visible. The hymen is torn deeply and is represented only by a row of small tags, called carunculæ myrtiformes.

The abdominal walls in many women regain their previous elasticity very slowly and imperfectly. In a few the tonus is well preserved. A great deal depends on the amount of distention of the abdomen before labor and the development of gas in the bowels after labor. Attention to this will aid in preventing what the women call a "high stomach." The sequelæ of insufficient abdominal wall support are, enteroptosis, with all its symptoms, pendulous abdomen, obstipation, etc.

Changes in the Breasts.

These consist in the commencement of the function of lactation, whereby the woman is put in a position to continue the nourishment of her offspring.

Nature has made woman an exception to the rule of other mammals. In her the secretion of milk does not begin till the second or third day, rarely on the first. In animals the milk is present in the glands in the first few hours. This is possibly an outgrowth of civilization, in that the function of reproduction is not allowed such full play as formerly, and lactation especially has often been neglected or impossible. The changes occur in the breasts after abortions from the fourth month on, as well as after labors at term.

On the second day, or as is usual, on the third day in primiparæ, the breasts begin to get harder, the veins become prominent, the whole organ fuller and heavier; the patient has the feeling that the secretion of milk is beginning. Soon the swelling reaches a considerable degree and the individual milk ducts can be felt as hard strings, the lobes of the breasts as hard lumps. The gland is much fuller with blood and feels hot to the touch. Rarely it becomes reddened. The milk comes into the breasts with much more rapidity in primiparæ; they express it as "shooting in" and the distress caused is sometimes very severe.

The woman says that the breasts feel like two hot weights on her chest, and if the little extension of the gland which sometimes lies in the axilla is involved the patient keeps her arms outstretched in considerable discomfort if not pain. This is attended with a flow of milk from the breasts even if the baby does not nurse. At each nursing the milk comes with greater force, but after 24 hours the process is not so active, still there may be too much milk for a week.

the binder being always more or less wet with it. Lesser degrees of activity of the breasts are common.

This swelling of the breasts has nothing to do with inflammation, the patient has no temperature or at most one-half degree F. There is nothing that could be called "milk fever."

In multiparæ the secretion begins earlier, sometimes even in the 12 hours after labor, and the breasts do not take on such sudden action, but the secretion begins more gradually and seldom do the breasts swell so that the skin is stretched over them tightly as in primiparæ.

The enlargement of the breasts is not due wholly to milk. It is only a small part of the milk that is formed before the nursing, most being made while the child is suckling. The distension of the breasts is due to the swelling of the gland cells, and the lymphatic engorgement, both preparatory to the formation of milk. As soon as the child begins to nurse the gland cells break down into fat globules, the cells produce the milk plasma from the lymph in the distended lymphatics, and active secretion is established somewhat analogous to the action of the parotid gland.

The first milk that comes resembles the secretion that may be pressed out in the latter part of pregancy, i. e., it is watery and contains yellow streaks. It is called colostrum.

The colostrum under the microscope is seen to be made up of fat globules, a watery fluid, and the co-called colostrum corpuscles. The fat globules are often adherent by a thin substance which is visible only by means of certain reagents. The colostrum corpuscles are round, ovoid or stellate cells which sometimes show ameboid movement, have one to three nuclei which color with ammonia carmine. They often contain numerous fat globules. Where they come from has been disputed. Believed to be changed gland epithelium or leucocytes. They remain four to six days and reappear if there is stasis, or inflammation. In addition, lymphocytes are found, more or less full of fat drops, indeed they may be balled together so that they can hardly be recognized as white blood cells.

It is still unsettled whether there is a membrane of casein around the fat globules or not. The globules float in a thin almost transparent serum, which contains a slight amount of albumin.

Source of the various elements of the milk. The fat comes from the epithelium of the acini in that the cells which at rest are flat with a biconvex nucleus become large and cylindrical. Fat appears in the periphery of the cell and is thrown off. After several repetitions of the process the cell itself becomes fatty, degenerates and is cast off, a new one being formed from the neighboring cells.

The casein, since it does not exist in the blood, must be formed in the gland. It is thought (Kuhne) that there is a ferment in the alveolar epithelium which changes the serum albumin into casein.

The milk sugar is made in the gland, since it does not exist in the blood. If milk stasis occurs, the sugar appears in the urine.

The fluid parts of the milk come as a special excretion from the glandular epithelium. That filtration has much to do with it, is very doubtful; Schroeder says it is a transudation from the blood vessels. In addition there are ferments or enzymes in the milk.

These are necessary for the child; they make the milk a living secretion, without which the child cannot thrive. They cannot be imitated by the finest chemistry.

The quantity and quality of the milk varies.

1st. *With the individual.*

2nd. *With the race.*

3rd. With development of the body; a small, thin woman usually gives more milk than a large, muscular or fat woman, the same rule holding good with cows. Nor does the size of the gland cut much figure, the gland lobes may be less than the fat of the organ.

4th. *Nutrition of the patient* to a certain degree; over-feeding causes a decrease in the amount of milk.

5th. Age of the patient. Before 20 and after 30 less and poorer quality, before 20 less sugar, after 20 more water.

6th. Toward the end of lactation the milk gets poor in quality and less in quantity, though there are exceptions.

7th. The milk of the two breasts varies in quantity and quality and from day to day, and at different times of the day.

8th. Hunger decreases the amount of the milk; fat, casein and sugar decrease, the amount of albumin increases.

9th. Emotions may alter quantity and quality, perhaps give child colic, diarrhea, said even convulsions. May produce agalactia.

10th. Menstruation may alter quantity and quality, perhaps give child colic, diarrhea, but this lasts only a short time.

11th. *Pregnancy.* Milk gradually dries up, after becoming more watery. If nursing is kept up milk may continue.

12th. *Drugs* often reappear in the milk. This has been known since Hippocrates in connection with cathartics.

One may, in order to purge the infant, give the mother the cathartic. Alcohol is said also to pass over, and cases are cited where the baby got drunk. Opium has caused 43 hours' narcosis of the baby. Iron, arsenic, iodine, lead, mercury are well known to pass over.

Brieger has shown that immunizing doses of tetanus antitoxin pass over to the infant. The writer allowed a woman with diphtheria, who had large doses of antitoxin, to nurse her infant. The child did not take diphtheria. Vaccinia is not believed to pass over.

13th. Disease has an important effect on the milk. Diarrheas cause a diminution; in cholera sometimes completely. In sepsis the milk sometimes dries up, which is a sign of bad omen.

Bacteria can pass into the milk in disease (Kehrer). Tuberculosis, anthrax, may pass over without any change in the gland, but often there exists a pathological process in the gland itself. In mastitis the milk may contain cocci, and pus, which infection may have come from the outside or, rarely, from the blood.

14. Irritation of the nipples causes an increase of the secretion. This is demonstrated clinically in many ways, e. g., by placing the baby to the breast early, the milk comes earlier, and by using the breast pump too much to "relieve" the breasts there is more milk, etc. Massage increases the milk supply.

15. Certain foods are said to increase the secretion. Somatose, nutrolactose, oysters, gruels. My experience is negative. Liquids increase amount of milk.

Lactation has a not unimportant bearing on the general condition of the woman. A certain amount of blood and fat must be eliminated after pregnancy. Part of those go in the lochia, part in the excreta and part in the milk.

If the last is not excreted the other organs must remove the excess. We therefore, according to Kehrer, have congestion, especially of the genitalia, etc. Fact that when the patient does not nurse that the lochia are increased and that the involution of the uterus is delayed, but this is generally explained by the absence of the reflex irritation which nursing causes on the uterus. Positive observations are not on record, but in general it may be said that a woman recovers better from her labor if she nurses her offspring.

The amount of the milk varies from day to day. Impossible to tell how much milk is secreted since some flows away, and the baby gets only a part. Each day baby gets:

1	2	3	4	5	6	7	8	9	10	11 day
0	96	192	234	363	441	501	518	621	648	705 gm

It often happens that when the baby is put to the breast the milk flows from the other also. This is due to reflex irritation of the other breast. The flow usually ceases after the nursing is kept up for a few minutes, sometimes sooner or later. Not pathological.

General Changes in the Puerperium.

During the hours after labor the patient feels tired, but not badly. She often sleeps after the room has been ordered and the excitement quieted down. Within the 24 hours she feels much rested and often, in a few days, anxious to get up. If a difficult operation has been performed the time for these changes is lengthened.

A multiparae is likely to be annoyed by after-pains, *i. e.*, uterine contractions. If the tonus of the uterus is marked, as in primiparae, the contraction produces little pain if any. The contractions occur especially when the baby nurses—reflex to the uterus from the

breasts; also if there are clots or remnants of the secundines in the uterus (they cease when the organ is emptied). They occur more frequently in women who have had endometritis or one or more abortions, and after labors where the uterus was much distended and emptied suddenly or rapidly, while they are likely to be absent if the labor was long and prolonged. They persist one, two or three days, rarely longer. If they appear after being absent they usually indicate a pathlogical condition, e. g., sepsis.

The lung capacity of the puerpera is increased, and the pulmonary resonance is usually clear and pronounced. Respirations are not increased in frequency, but respond quickly to anything pathological, e. g., sepsis.

Temperature.

This has been considered of the greatest importance till recently, when the pulse has to a large extent come to be relied on for diagnosing diseases of the puerperium. But the best results are gotten by a study of the two together.

Immediately after or during the second stage temperature ought not to go above 100.2. Over this one must think of sepsis. The severe muscular exertion does not raise the temperature much. After birth of the child the patient may have a chill, already considered, or it may come after the third stage. Has several causes, sometimes due to sepsis and then there is fever. As a rule the temperature during the puerperium does not vary much from the usual temperature of a woman.

The temperature which may be considered normal is put differently by the various authorities. Fehling says 38.4 C. (101.1 F.); Winchel, 100.7; Boxall, of London, 100. It is to a great extent arbitrary. My own experience is that if the temperature rises above 99 F. there is usually some cause for it and always (almost) a mild infection. In a case which you treated yourself and where you know the nurse, the temperature should not rise above 99.5 and many cases will not show a rise above 98 6-10.

In the first 12 hours after labor there is usually a rise of one-half a degree. If the labor terminates in the morning, this added to the usual afternoon rise. If in the evening, the next morning temperature is not much changed.

There is a variation between morning and afternoon temperature of 1° F., seldom more. Larger variations in primiparae. But there is not much difference (if any) in the temperature between primiparae and multiparae.

There is no such thing as milk fever. Formerly, in the non-antiseptic days, almost every puerpera had fever on the third day. Since at this time the breasts got large and hard, the fever was ascribed to the violent coming of the milk, and the real cause, the infection of

the genitalia, was overlooked. With the advent of antisepsis there has been a great decrease in this so-called milk fever, and large numbers of the best authorities deny its existence.

Dr. Jaggard said he had never seen a case where there was fever and no other cause to be found than simply the coming of the milk. I have seen primiparae with the breasts standing out hard and firm, the axillary lobe of the gland so swollen that the patient had to keep the arms from the sides, and yet the temperature 98.6. If there is infection of the breasts it is another thing. Milk fever is a term that should be abolished from obstetrics. It too often forms the cover for severe puerperal fevers and many a woman has lost her life because of the term.

The temperature of the puerperal woman is subject to fluctuations on very slight causes as compared with the non-puerperal woman.

The reason usually given that the puerperal woman should have some fever in this: The products of the regressive metamorphosis of the uterus and all the genitalia absorbed must be oxidized. This increased oxidation causes the increase in the body heat. But nature has a very good way of regulating this. By increasing the perspiration and other excretions the temperature is kept nearly normal.

Said that mental shock and emotion can give high temperature, some cases seem to prove this, but be careful to shut out everything else. Have never seen an unequivocal case. Constipation sometimes gives rise to temperature, which goes down when the bowels are emptied. This is probably due to obstruction to the flow of lochia, which is overcome when the bowel is emptied. It is safest as soon as your puerperae have fever to think of infection first.

The Pulse.

In the second stage of labor the pulse is high, rapid, irregular, but during the third stage it calms down and is normal during the time unless there is severe hemorrhage, when it becomes small and rapid. Immediately after the labor the pulse is soft, but soon has a high tension, especially in multiparae.

A very high tension slow pulse must be regarded as a warning of eclampsia.

A peculiar phenomenon is sometimes observed in healthy puerparae. The pulse rate may be as low as 40 a minute and some observers have found 30, but this is very rare. It occurs after labors at term more than after early abortions; in multiparae more often than in primiparae.

The cause is not known. There are many theories, of which the most plausible are: Fehling's—the sudden diminution of the intra-abdominal tension irritates the vagus reflexly; Schroeder's—the heart, which hypertrophies (perhaps) during pregnancy, now need not work so hard; Olshausen's—the fat which is absorbed from the

uterus slows the heart. Further, the horizontal position, the quiet of the patient, the less amount of food, etc., may conduce to the slow pulse. It is of great prognostic significance in that a pulse which is slow means that everything is going along nicely.

A very rapid pulse in the puerperium, in the absence of fever, points to hemorrhage (recovery from severe hemorrhage) or some heart disease. Not seldom a rapid pulse draws attention to the condition of the heart, but be careful in the diagnosis of heart disease in pregnancy and puerperium because murmurs are common.

The arterial tension at first decreases, later is increased.

The Blood.

There is a decrease in the amount of blood which had increased during pregnancy. This decrease is due to, hemorrhage during labor, the lochia, sweat, and other excreta. In the first days after labor there may be a decrease of both reds and whites, but soon the whites begin to increase and a slight leucocytosis may be observed. In general, the blood changes are not well known.

The Skin.

All the functions of the skin are more active, the sweat glands particularly. After labor, when the patient is well covered up, she breaks out with a full warm sweat which may be so profuse that it is considered necessary to change bed linen. This is so frequent that it is considered normal, but there is no doubt that it is favored by the warm covers and the administration of warm drinks. That there is a sweating peculiar to the puerpera is not true.

The tendency to perspiration is less in the latter days, probably due to the establishment of the milk and free lochia.

The laity have great fear that the patient takes cold. This is the outgrowth of the old belief that puerperal fever comes from catching cold, and it is still said among the midwives, so that it is not unusual to find the windows closed and the patient covered with blankets even in summer.

Ahlfeld says that there is some connection between the appearance of the sweat and the contraction and retraction of the uterus after labor. The puerpera has a peculiar odor, which varies in health and disease.

The Kidneys.

Relieved suddenly from the increased intra-abdominal pressure, the kidneys become active. In the third stage it is not rare to find the bladder full and even overfilled, making an obstacle to the delivery of the placenta. The urine contains frequently a little albumin, white blood corpuscles, a few reds and scattered hyaline casts. In 12 hours these disappear from the urine. The amount of the urine for the first eight days is 300 to 400 grams more than that of the

non-pregnant woman, but is not much more than that of the pregnant woman in the latter months. (Kehrer.)

Specific gravity varies from 1014 to 1016, according to the amount of the urine. The amount of urea varies. On the first and second days, moderate; greatest on the third day, and now continues at a high percent during lactation. The increased metabolism of lactation (i. e., the change of albuminoids into fat) gives the increase of urea. On the third day to 2.6%; after, 1.6% to 2.2%. The proportion of salts, NaCl, phosphates, sulphates is not much different from the usual.

In addition to the ordinary urinary constituents, milk, sugar and peptones have been found. Milk sugar is present physiologically—Blot first called attention to it. It is due to the absorption of the sugar from the milk. The amount of sugar is seldom over 1%. It is a good sign in the urine, showing an abundance of milk.

Peptone has been found very often in the urine from the second to the tenth days, after this disappearing. This is due to the degeneration of albuminoids in the uterus, and is evidence of the necrosis of a certain part of the uterus with absorption. Albumin is found sometimes for a few days after labor, but in very slight amount. As a rule, however, albuminuria after the first 48 hours must be suspected. Urine must be drawn with catheter to avoid contamination with the lochia. After kidney disease in pregnancy, albumin disappears quickly, perhaps entirely. Further, there may be albuminuria after narcosis with $ChCl_3$, or ether, a fact not to be forgotten. But this disappears quickly unless there be some previous nephritis; often the albumin comes from a slight catarrh of the bladder.

Pathologically albumin occurs after labor in pyelitis, sepsis, etc.

In the first 12 hours there is usually retention of urine. This is due to the lack of elasticity of the bladder, the horizontal position, the swelling of the vulva and urethra, sometimes to kinking of the urethra (Olshausen). Still quite a percent pass urine spontaneously. In many cases it is necessary to use the catheter. As a rule, patients pass urine three times daily, much less often than in the later months of pregnancy.

The *Weight* of the patient undergoes marked changes in the first months after labor. According to Gassner, the average weight of 238 women on the day after labor was 124 lbs. In the puerperal two weeks they lose about 9 lbs. or 8% of their weight. The loss is greater in multiparae, greater in large women, and after normal than premature labor, also greater after twins. Should she put on flesh, the milk is likely to dry up. This great loss of weight is due to (1) the moderate amount of food taken, and (2) the great amount of excreta, the sweat, the urine, but especially the lochia and the milk. This is the reason women look thin, pale and washed out after getting up, and need a tonic diet. Regains her weight in four to six

weeks. Nowadays, since we do not starve the woman so much in the puerperium, these losses are not so marked, but the custom of feeding puerperae very lightly still exists in many places.

The Intestinal Tract.

The appetite is at first not very strong, but the patient wants water and drinks a great deal. Reason is plain. Soon she demands some solids, and one need not refuse her (see later). The abdomen after labor has a concavity. The uterus can be seen as a hard prominence over the pubis, but from the navel to the ensiform the surface is usually concave. Soon this fills out. Sometimes tympany develops, but this goes down in one or two days. If the bladder is full you can see two tumors, one above and to the right of the other. You may often see and feel the coils of the intestine and the peristalsis. If a multipara this is especially plain.

Constipation is very common. Very seldom a bowel movement before the third day, and then usually with some castor oil. You may be able to feel the sigmoid flexure full of feces. Constipation is due to weak peristalsis, from the quiet of the patient, also the weakness of the abdominal muscles, which have been stretched so much, and further, the fluids of the feces are absorbed as the excretion of fluids is great.

Diarrhea is very rare in normal puerperae.

The Nervous System.

The mental condition of the woman is one of increased excitability. Slight irritations have a great effect on her. This was known to the Romans and they had a sign before the door so that she was not disturbed, even by the tax collector.

Bad news, it is said, can give the woman fever. If there is a hereditary taint in the family as regards insanity, it may come out now and cause one of the numerous psychoses of the puerperium, usually melancholia. After eclampsia these are not rare.

The puerperal woman hears more acutely and is more sensitive to light, and according to Dionis, to bad odors; her reflex excitability is also increased.

Recent investigations of the knee jerk in pregnancy, labor and puerperium show that the reflex is more active than usual in pregnancy, most active in labor and at the height of a pain, while the excitability gradually passes during the puerperium.

Diagnosis of the Puerperium.

Of course rarely any difficulty, the history being given, but in medico-legal cases it may be necessary. One must be very careful because the diagnosis is not always easy and only rarely can one assert with positiveness either fact.

Get the history from friends of the patient, e. g., gradual enlargement of the abdomen, usually called dropsy; then sudden diminution, sudden illness, or incapacity for work; nausea and vomiting six months ago; bloody bed clothes, etc. Still this could come from a polyp or something else.

General Examination. Pigmentation, striæ, loose, flabby abdomen lends a suspicion, more or less strong, depending on the degree. Presence of blood, meconium or vernix caseosa has great importance. Look also on the linen of the patient and bed.

Local Examination. Breasts: size, follicles, milk, especially colostrum. But this is not certain, since in multiparae can get some milk almost always; the amount of milk is significant.

Genitals give the most positive information, but then, too, only in primiparæ. Depends greatly on the time elapsed since the labor. The labia are large, soft. Tears of the labia and hymen are important, but the tears of the hymen must be deep, because coitus tears it as a rule. If there is a fresh tear of the perineum the diagnosis is easy, if no operative treatments have been pursued. If the baby was small, especially if macerated, there may be no tear of the hymen even.

The condition of the wounds and the discharge, *shreds of decidua, decidual cells,* the lochia, if the labor be not long passed, give importance in conclusions. The large, loose and blue condition of the vagina lasts about one week, the rugae are never so prominent. Later the vagina is bright scarlet and velvety, bleeding easily.

The cervix shows the bilateral tears. The shape of the external os is changed from a cone with a round hole to a cylinder with a slit in it. Still some virgins have a slit-like orificium.

The uterus is large, soft, depending on the day of the puerperium; and in anteflexion. The cavity is large and if one can insert the finger, may feel the placental site, round, irregularly rough, which is positive. The cervix is very red and has many papillary erosions in the process of healing. Hegar's sign is present after the fourteenth day for several weeks.

The answer to the question, how long ago did the woman have her baby? is very hard, and depends on the character of the findings, especially the condition of the wounds and the size of the uterus.

To answer, was the child viable? is still harder. Severe injuries, many striæ, i. e., the signs that the uterus held a large body and a large body passed through the genitals.

After abortions it may be impossible to tell the condition with positiveness.

THE NEW-BORN CHILD.

The most important part of a child's life is that part spent in utero. The life is simply one of growth. It has been said that the fetus lives in a state of "dreamless sleep." This is not probable; rather we believe that the fetus has periods of rest and activity. That the fetus drinks liquor amnii there can be no doubt, and other movements have been diagnosticated; hiccough is one and a not infrequent sign of intra-uterine life.

Sometimes the women say that they can feel the fetus stretch himself, "sich recken," as the German women say. Weber, in Marburg, has described movements of the chest of the fetus which bear resemblance to nothing else but respiratory movements. These I have observed twice—slight up and down movements over the chest and back, about 50 a minute, not synchronous with the heart of the mother or that of the child. These respiratory movements are too superficial to cause anything to be sucked into the lungs, but enough to keep up the circulation in the chest. The metabolism of the fetus is relatively simple, but such as it is, it is very little understood.

The change from intra to extra-uterine existence is a very sudden one and is attended with a severe shock to the child, which in some cases it does not withstand. It may happen that the child is not properly developed to assume an existence in the world, e. g., monsters or infants with congenital heart disease. What concerns us are the changes which take place and the physiology of the first days of life.

The change from the state of apnea in which the fetus exists before birth to external respiration has been already considered. (See Physiology of Labor.)

At first the baby breathes very irregularly, any marked breathing being usually attended with kicking and movements of the arms. The crying of the infant is beneficial, since it serves to expand its lungs. As it is, the lungs usually do not expand fully for several days. The respirations are both superficial and deep, the two alternating. Expires from 39 to 47 c. c., average 45 c. c. A slight rattling can often be heard for several hours after birth. This is due to mucus from the vagina which has been sucked in, or to an increased secretion of the throat due to congestion during labor. It is important in that it may give rise to brocho-pneumonia (rare), or if swallowed, to enteritis (common). It is three or four weeks before the respiration is regular and even, but is still subject to quick fluctuation.

The respiration is at first thoracic, later mixed, but in pathological cases (asphyxia) may be abdominal Whining is not normal; and occurs in puny, premature babies or such as have been severely injured during difficult extractions.

The Blood.

Is more concentrated, contains more hemoglobin than the adult. It contains a few nucleated reds, and a large number of whites, being quite marked at first. The nucleated reds soon disappear.

The Pulse.

During fetal life it is 120 to 140; immediately after birth it sinks, but rises, and within an hour is 130 to 144. Soon 120. During the ensuing days there is a slight increase in the number of pulse beats, but after the first month there is a decrease. The pulse is irregular (Vierordt) in frequency and in strength.

The Temperature

Of the fetus in utero may be one-half a degree F. higher than that of the mother taken in the vagina. This is because the fetus has its own metabolism.

Immediately after the labor it sinks often two degrees F., especially if the fetus be allowed to lie exposed in a cold room. In 12 to 24 hours the temperature rises again to 98.8 or thereabouts, and stays here with slight evening variations, which are irregular.

Slight causes in the new-born can raise the temperature, e. g., crying, digestion, and slight exposure to cold or dampness lowers it.

Urine.

Varies very much in different children, and there is no rule. Amount found in the bladder at birth varies from 7½ to 9 cc. The total amount of urine in the early days has recently been estimated by Reusing.

1	2	3	4	5	6	7	8	day.
18.9	38.6	64.9	84	121.5	147	175.5	217.2	c. c.

The amount varies with the size of the child (smaller in premature children), and with the food, if mother's milk, smaller amount of urine; the bottle-fed large amounts, since they receive more fluid. Infants pass more urine in proportion to their weight than adults.

Specific Gravity about 1006 on the first two days; goes up to 1012 on the third and fourth days, then sinks to 1005.

The color is watery, clear, but gets yellower soon, seldom deeper than straw.

The reaction is acid, and the urine not seldom contains albumin, hyaline and epithelial casts and uric acid crystals, the first few days. Sugar, according to Pollak, is not uncommon in normal urine.

The percent of urea is highest on the third and fourth days, 1 1-10%; after this it sinks to 8-10%. These figures are large, later investigations by Martin and Ruge give one-fourth these amounts. The percent of uric acid is large, and explains the frequent occurrence of uric acid infarct of the kidney. This appears as a brownish infiltration of the papillæ of the kidney, which grits a little under the knife. Formerly believed that the deposit in the kidneys was acid soda or ammonia urate, but now believed to be pure uric acid. The deposit which appears on the diaper as a reddish stain occurs more often in icteric children (Hofmeier). In these the amount of urine is small, also. In children who receive a large amount of water the "infarct" is rarer.

General Condition.

Observing the child after birth, it is seen to be in a half-sleeping state. The eyes are opened once in awhile, but immediately closed, the arms move, also the legs, sometimes quite vigorously. The difference between sleep and waking is not very well marked till the end of the first week, or even later. Of the special senses, touch and taste are already well developed. The sight is already developed; the light reflex is certainly present. Hearing is developed as early as the first day. The sense of smell develops later.

The Intestinal Tract.

Shortly after birth the meconium is discharged. This is due to the presence of gas in the bowels (from air swallowed) and to peristalsis, which becomes active after birth, perhaps due in part to the partial asphyxia which the child undergoes during birth. The meconium continues for two or three days and then becomes brownish, later yellow if the baby is fed at the breast. The yellow stools contain large numbers of bacilli, and the Bact. Coli. Com. It is said that these bacteria are useful in helping to split up various constituents of milk. The movement normally is like soft homogeneous putty, of a golden yellow color.

It is said that the stomach of the new-born is placed vertically or parallel with the long axis of the body. In several autopsies I have found the stomach in the same position as in the adult. Normally the infant passes two stools a day, but if the bottle be used, there are more. They then contain whitish particles of undigested casein, and greenish mucus. There is also an odor which is distinctly sour or may be fetid. Normally no mucus should be seen, and the water stain a half inch around the edge of the solid part of the stool.

The stomach contains pepsin, and the pancreas contains trypsin and the fat splitting ferment, but no diastatic ferment (Zweifel). All these are present in small amounts. The colostrum has a slightly purgative action which is due in large part to its indigestibility.

Weight.

The infant loses in weight for three to four days. The loss is about 220 gms.; is greater in bottle fed than breast babies, and when the cord is tied late.

The original weight is regained by the tenth day, often later, and from now on the gain is continuous. The loss is due to the excreta—meconium, urine, evaporation—and also the fact that the new-born gets very little nourishment in the first few days.

This does not occur with animals and has an important bearing on the diseases of early infancy.

First day	loses 139 gms.
Second day	loses 64 gms.
Third day	loses 33 gms.
Fourth day	gains 50 gms.
Fifth day	gains 50 gms.
Sixth day	gains 36 gms.

After this about an ounce every day for ten days, then less. These figures will vary very much in individual children. Some lose little. Some lose quickly and regain quickly; others regain slowly.

The Skin.

The *Skin* presents many changes. At first the baby is cyanotic, especially the face. The eyelids are not rarely swollen. In a few minutes the color becomes red. The vernix caseosa dries up, the epithelium scales off in branny scales, or there may be pronounced desquamation. The skin underneath looks at first a little raw and may crack, but soon a nice healthy pink or white appears. The eye-lids especially, if washed roughly and almost always if $AgNo_3$ be used, are red and swollen; may secrete for a few days, or the lids may be even stuck together.

The skin is liable to eruptions, especially of tiny vesicles with watery or slightly clouded contents. This used to be called *scrofulous*. Or the vesicles may be surrounded with red borders or the redness may be present with few and scattered vesicles. They are usually due to the too free use of water and soap, and heal rapidly when the causes are removed. Heat also causes an eruption.

A prominent and frequent change in the skin is Icterus Neonatorum.

A large number of children (80%) have jaundice in the first days of life. Under aseptic conditions the percentage is lower. Less than 40% at the Chicago Lying-in Hospital. We distinguish two forms, Icterus Gravis and Icterus Simplex. Jaundice may occur as a symptom of various diseases of the early days, especially sepsis, and also the hemorrhagic diathesis and Buhl's disease. Our attention is directed here to the simple jaundice, or Icterus Neonatorum.

Symptoms.

About 40% of new-born children become icteric. The jaundice begins on the second day, but may appear later, but seldom any earlier. The face and body are first colored, and if the case is severe, the conjunctiva. It disappears usually at the end of three or four days, but if the scleræ are colored, it takes longer. The skin is usually a little red and may hide the yellow. Sometimes stays four weeks. Press the blood away and the finger mark is yellow. Whereas in the icterus, from obstruction, of adults the scleræ are the first affected, here they are affected late, and indicate a severe case. The internal organs, especially the intima of the arteries, also the cartileges and interstitial tissues are usually icteric. The brain and cord slightly, the liver and spleen very little if any. The kidneys almost always contain the "uric acid infarct."

The cases of jaundice are not limited to any district, to private or hospital practice. Seen more frequently in the babies of primiparæ and in boys more than girls, and especially with children that presented by the breech. Premature and atelectatic children especially liable, also operative cases.

Generally the child suffers no change from this condition. The urine may be a little brown sometimes. But examined more carefully, one finds that severely jaundiced children grow less rapidly than the others, lose weight, perhaps have fever, are colicky. Oxidation processes more rapid. The excretion of uric acid and urea is greater (Hofmeier). Therefore more albumen used up. Bile pigment has been found in the urine.

Etiology.

Formerly considered either hematogenic or hepatogenic. But now known that both factors operate. The bile acids have been found in the fluid of the pericardium, therefore the liver must enter into the causation. There is no doubt that in the blood of the new-born children there is great destruction of red blood corpuscles, and if this is so, there is more material for bile. But some authors claim that the degeneration of the red blood cells is due to the presence of bile. Admitting that there is a greater destruction of red blood cells than there usually is, and therefore an increase in the amount of bile, why is this absorbed?

There are many theories, e. g., obstructions of the (1) ductus choledochus, by mucus, or epithelium or (2) edema of Glisson's capsule, (3) changes in the circulation of the blood in the liver, (4) absorption of the bile from the intestines, which may take place directly into the blood or the general circulation as a result of the persistence of the ductus Arantii.

Infection has been given as a cause, and for severe cases is usu-

ally active. The prognosis is good, but in weak children, especially premature infants, it may not be so good. Of course, if the jaundice is a symptom of some severe disease, e. g., sepsis or syphilis of the liver, Buhl's disease, etc., the prognosis is bad. Treatment for the lighter form is nil. If severe, especially if the infant be premature, careful nourishment. Often there are symptoms, too, of intestinal fermentation, indicating calomel, flushings and regulation of the diet.

LOCAL CHANGES.

Separation of the Cord.

The cord is inserted into the belly of the child, the vessels passing through the abdominal wall, the amnion covering the cord becoming continuous with the skin. The skin is usually prolonged upon the cord for a short distance, sometimes half an inch, called the skin navel. Rarely the amnion forms part of the skin near the insertion of the cord, amnion navel. Vessels from the arteries of the abdomen make a circle around the navel, send up tiny branches, which end about 1-12 inch on the cord itself. The piece of cord not in connection with this circulation must necrose and fall off. At the point of union of the dead and living tissue a reactive inflammation occurs, a line of granulations forms and the piece of cord is gradually separated from its base.

There are two ways in which the cord behaves; 1st, mummification; 2nd, moist gangrene. The first occurs when the cord is kept warm and dry, the second when being wrapped in oily dressings the evaporation is prevented. The drying-up of the cord is more common, and is to be favored. A large thick cord dries up late, and some authors advise to strip all the jelly of Wharton from the cord, so as to favor the rapid mummification.

After a few hours one can see evidences of a reactive inflammation, the skin around the insertion of the cord is red and swollen. White blood corpuscles wander out and soften the cord at its junction with the body till a layer of granulations is fully formed. The cord finally drops off, the arteries first and then the vein. The surface of the navel is covered with very fine granulations, the center is retracted, the sides falling in, epithelium forms over the surface very quickly and the navel is cicatrized. The cord drops off from the fourth to the twelfth day. The majority of authors give the average as the fifth day. Our experience has been much different, with the older methods of treatment of the stump, it being exceptional for a cord to drop off before the end of the week. Now the cord is tied close to the insertion in the skin (but not involving it), and under aseptic treatment falls off in three to six days, seldom later than the eighth.

The retraction of the center of the wound is due to the retraction of the intra-abdominal part of the arteries. The healing of the navel is complete on the third or fourth day after the dropping of the cord.

The umbilical vein collapses, the walls adhere, but there is no thrombosis normally. The hypogastric arteries collapse and owing to the thick muscular layer are quite obliterated, but a small clot almost always is found in them. This should not present the appearance of pus normally.

The separation of the cord takes place earlier in large, strong children, later in premature children. Earlier in healthy children, later in sick children. Later if wet, earlier if drying up of the cord is favored.

The staphylococcus and streptococcus and various non-pathogenic bacteria have been found in a large proportion of cords of healthy children. They were much more in quantity and much earlier found when gangrene of the cord occurred. The method of dressing the cord had a great deal to do with it.

The new-born child presents the various changes of its body due to the operation of the factors of labor. The form of the head has been spoken of. Even after 12 hours the change toward the normal is marked. At the end of 72 hours the form is usually the same as before labor. If there is distortion after seven days the asymmetry is congenital. If the child came by the breech with the feet along the face the doubled position may persist for several days.

The *Breasts* of some new-born children show an interesting phenomenon. On the third or fourth day they enlarge, become hard and occasionally secrete a little watery milk with yellowish streaks. Microscopically it resembles the colostrum, and the colostrum corpuscles may be found. On the fifth or sixth day a fluid resembling milk in color and taste may be pressed out. This continues for two to four weeks if the gland be irritated, but if left alone the secretion dries up and disappears. In rare cases a little fluid can be expressed after a year. This condition must be distinguished from true mastitis of the infant, a disease which does occur. The secretion is called by the Germans Hexen-milch, Witch's milk, and occurs in boys as well as girls, really it seems oftener in boys than girls, in weak as well as strong children. The breasts should be left alone. Wash them with soap and water, pad them lightly with cotton and tie a bandage over them. *Do not squeeze them.*

In about one case out of twenty the female infant will present a phenomenon resembling menstruation. The flow may last from one to six days, be very slight or profuse. It usually is not attended with symptoms, but if profuse may produce evident malaise in the child. It was a prominent symptom in one case of cerebral hemorrhage following the forceps operation. See Obstetrics for Nurses.

CONDUCT OF THE PUERPERIUM.

Immediately after labor the patient receives a thorough washing of the genitals and parts that have been soiled with blood. Use 1-2000 $HgCl_2$ for this. A vaginal injection in *normal* cases is never necessary.

I do not believe a douche can disinfect an infected parturient canal and use it only before passing the hand through the vagina into the uterus when necessary in such cases. In ordinary cases I mop the vagina thoroughly with cotton soaked in 1% lysol before operating. If there is post-partum hemorrhage may have to give a hot vaginal or uterine douche.

The sheets are removed, the night dress, if soiled, also, clean dry ones are put on. The patient must not sit up for any of these procedures, and in turning her to the side, etc., a hand must be on the uterus, assured of its contraction (danger of air embolism).

There is a bloody oozing from the vulva for several hours after labor, and this requires a frequent change of napkins. The napkin consists of a piece of ordinary absorbent cotton wrapped in a piece of gauze, sterile or bichloride.

The nurse must watch the patient carefully for the first hours after labor. (The doctor ought to stay at least an hour after the placenta is delivered.)

As soon as possible the room is gotten to rights and the patient is given a chance to get her much needed rest. After her bed is fixed she is warmly covered up, lies on her back and generally goes to sleep. Every 20 or 30 minutes the nurse feels her pulse and slips her hand on to the uterus to feel if it is hard. If after 2 or 2½ hours there is no tendency to hemorrhage, the patient may be considered safe from this accident.

The nurse now attends to the child, which till now has been wrapped up in the woolen receiver and is kept in a warm place. The majority of doctors allow the binder to be put on, and the nurse herself generally puts it on unless told otherwise. She believes that it conduces to a good "form" to put on a tight binder. There is no doubt that supporting the abdominal walls during the puerperium does help to prevent the occurrence of pendulous abdomen, but it is not necessary to bind the belly so tightly as is the custom. For the first 12 hours I forbid the use of a tight binder. Put on loosely enough so that you can put the hand under it to feel the uterus. It will remove the empty feeling and the tendency to syncope. If

there is a tendency to faintness from the sudden emptying of the abdomen put a sand bag (warm) on the abdomen.

After 12 hours the patient may be bound up moderately tight and this should be kept up for *three weeks after the patient is out of bed.*

Antisepsis During the Puerperium.

This is every whit as important as during labor. Many cases have been successfully carried through hard labors, but have been infected late in the puerperium.

The nurse is generally responsible for late infections, but the doctor is, too, if he should make local examinations, or come to the puerpera after attending diphtheria cases, etc.

Before touching the patient or touching anything that comes in contact with the genitals the nurse must wash her hands according to the directions.

Every four to six hours, the patient must have the genitals dressed. A sterilized bed pan is placed under her, and the solution is poured over the parts from a pitcher, or from the irrigator, 1-2000 $HgCl_2$ is used. The fingers of the other hand gently separate the labia and allow as much of the fluid as will run into the vagina. The excess is dried off with a sterilized towel.

If there are sutures in the perineum, the limbs are not separated so far. No direct wiping of the vulva is to be allowed, especially if there are sutures. After every urination and bowel movement the same process must be repeated. No other local treatment is made. No douches in normal cases. The patient must be instructed not to put her hands down to the parts, or to touch her nipples with her hand.

After each washing a new pad is put on, the old one burned. The Hartman wood wool pads are good.

The hands are not the only sources of infection. Unclean bed pads, infected bed clothes may come in direct contact with the vulva. These are especially dangerous if there is a perineal tear. Internal examinations are not made in normal cases. You must diagnose the condition of things from the general symptoms and the external findings. Examine only under the strictest indications and with extra carefulness. Continue the vulvar washings for 10 days. They need then be made morning and evening only unless there are sutures in the perineum.

Diet.

An important subject. Great changes from olden times. Formerly custom to give puerpera watery soups, for the first week, allowing solid food only with great reserve. Now a much more generous diet allowed.

No harm is done if the patient eats well during her lying-in.

Of course she should not continue as she has, since anybody put into bed suddenly ought to have a restricted diet.

Experience has proved that women with a fuller diet recuperate more rapidly, the child grows better, lactation being favored. After labor a glass of hot milk, or if the patient is not made wakeful by it, coffee, or hot malted milk.

For the first 24 hours patient wants fluid and let her have it. In the morning give her milk, which is not to be gulped down. At 10 a. m. a fine broth with a cracker in it. At noon a strained gruel of some kind. At 3 p. m. coffee with milk and cream. Evening, a broth with some farinaceous body to it. If she wishes cold drinks, a "milk shake," an egg lemonade, or cream lemonade in small amounts is allowable. Water, not too cold, ad lib. If the patient has lost a great of blood, give fluids freely, but see that you do not overload the stomach, as patient vomits easily. The second day patient may have strained gruel with thin toast in the morning. A soft egg with old bread at noon. Chocolate in the afternoon. Soft eggs or poached egg on toast in the evening. The next day at noon, a piece of tenderloin steak, not too well done. Patient may have as many as three eggs daily. Milk toast made from old bread in the evening. The really fluid diet need only be enforced for the first day. No solid fruits to be eaten. Juice of orange, orangeade, lemonade, soda water, ice cream, are all allowable, if the patient be used to them, small quantities. It is said that beer increases the flow of milk (?). Said also of oysters. Milk may be given in as large amounts as the patient will take.

After the fourth day patient may have rice or farina. Vegetables well cooked may be allowed after the fifth day. Fried stuffs are not to be given for two weeks, but broiled steak is allowed after the fourth day. In general the diet for the first week must be soft, easily digestible and leave very little waste. For many practical points and details see book, Obstetrics for Nurses, by the author.

Attention to the Bladder.

This should require the physician's and nurse's careful attention.

Immediately after labor it may fill rapidly, and may prevent the placenta from being expelled promptly.

The bladder should be emptied inside of the first 12 hours. If the woman cannot do this herself there are numerous little aids: 1st, let the water run in the room, or next room. Do not let her know the reason of this. 2nd, put her on a warm bed pan, with some steaming water in it and *leave her to herself*. 3rd, let a warm solution of sterile water run over the parts or put a moist compress over the bladder. The fluid running over the parts imitates the flow of urine. 4th, let her smell salts. If a very nervous woman try to get her attention away from the act. 5th, warm fomentations. 6th, may

allow her to assume the half-sitting posture. 7th, the catheter. Before having resorted to this, one must have tried the others and waited fully 12 hours, unless the bladder is full and causes distress. A full bladder may give rise to post partum hemorrhage. Do not use the catheter except in the most obstinate cases. The patient is so very likely to get a cystitis. If a woman has to be catheterized daily for over four days, a cystitis will almost invariably result. The nurse deserves the highest praise if she can prevent this.

Before passing the catheter, the vulva and especially the urethral orifice must be washed thoroughly with $HgCl_2$, 1-2000, or 1% Lysol. The hands carefully sterilized, the catheter boiled and wet with 1-2000 $HgCl_2$ or 1% Lysol, is carried directly into the urethra, *always by sight*. If the first pass should bring it into the vagina, it must be boiled again or another catheter used.

If vaseline is used to lubricate, the vaseline must be boiled. Do not allow the nurse to use the catheter unless she knows how. Try to avoid the use of the instrument, because the patient may have permanent bladder trouble from it. A certain number of women will pass urine if it be "suggested" to them. Urination ought to be three times daily. Do not pass the catheter this often. Twice daily if absolutely necessary.

Attention to the Bowels.

Custom, and it was a good one, gives one ounce Ol. Ricini on the third day. Now better to give it on the second day. Favors the secretion of milk and moves the bowels. Other cathartics, especially the salines, diminish the amount of milk. Thus, if patient not to nurse, prefer the salines. The oil may be given in orange juice. Or may be given in German Weissbier. Or may be taken on top of some sherry wine. There are many ways. Soft capsules. One bowel movement every day is necessary. Patient must not sit up for the bowel movement. After each bowel movement wash the vulva with 1-2000 $HgCl_2$. An enema daily may be necessary, also cascara.

In cases of ordinary perineal tears no change from the above. If a deep or a complete tear, special attention must be given. If it be deemed inadvisable to give the cathartic, a glycerine suppository may be used, or a soap and water enema. If the patient has signs of a pelvic peritonitis it is not best to give cathartics more than the first day of attack.

Attention to the Breasts.

During pregnancy the care of the breasts must begin. A retracted nipple may be somewhat developed. Little good is to be expected from hardening with alcohol. More rational is the annointing with cocoa butter after washing with water and soap.

Immediately after labor the nurse should wash the nipples and

surrounding skin with soap and water, then with 1/2000 $HgCl_2$, once only; thereafter, boric acid solution. Now anoint them with albolene or cocoa butter, cover with a piece of dry sterile or borated gauze. In attending to this the hands must be sterilized, and throughout no manipulation of the breasts may be made without first carefully cleaning the hands. This applies also to the patient, who may have gotten lochial secretion on her fingers.

The breasts should be supported with a moderately tight binder. If they are very large and heavy, a towel, rolled up, may be placed under each, beneath the binder, at the sides of the chest. This keeps the breasts from sagging down and relieves the heavy feeling. Or, two pillows laid alongside the body may support the breasts. If the milk should shoot into the breasts too strongly, the binder may be made with counter pressure, preventing to a slight degree the enlargement of the glands. Ice bags are supplied and a saline laxative given. After each nursing the nipple is washed with saturated solution of boric acid, then covered with the sterile or borated gauze, which is changed frequently, should it become wet. Three times daily the nipple is oiled with cocoa butter. I have found this a good preventive of cracks and fissures. Albolene may also be used for this. If there are fissures, use 2% boro-glycerine very frequently on the nipples. $AgNO_3$, 2% is also used. The object of these precautions is the prevention of mastitis. This is due to infection of the breasts and is in the highest degree preventable. Owing to the continual use of the breast the atria of infection are open for a greater period, and infection is not so effectually prevented as in the genitals. Estimated that 6% of women have mastitis, but in private practice this is too high. The cracks and fissures are the usual atria of the infection. They can be prevented by this treatment, and if present may be kept aseptic. Aside from the danger of infection, these cracks are very painful and may make nursing impossible. Try the boro-glycerine, then alternate with paintings of Comp. tr. Benzoin. If they will not heal with this, touch them with a little strong (10%) AgNo3, touching the crack only, and have the patient wear Wansbrough's lead nipple shields constantly between nursings.

Nursing the Baby.

Every mother, unless sick, should nurse her baby. No excuse other than physical inability, e. g., tuberculosis, etc., disease of the breasts, should be allowed. Better for mother as well as the baby that its own mother nurse it. In the absence of the mother's milk a wet nurse should be provided. It is said that no man became great if he was brought up on a bottle. No substitute for mother's milk has yet been found.

The question of nursing is an important one. Put the baby to the breast as soon as the mother has rested a little. This is usually about 12 hours after labor. Reason is, that even though there is very little milk, the baby learns the habit of nursing, the nipple is developed, the breasts are stimulated to secretion earlier, and the child gets what little fluid there is. The baby is put to the breast every four hours till the milk comes, then every two to three hours. Teach the infant good habits early. Put him to the breast at certain hours by the clock. He soon learns to wake up at those hours. A child can learn a bad habit in the first day of his life, and his mental training is begun immediately he is born. It is important to know if the child has gotten enough at each nursing. With a little experience the mother can tell by the aspect of the child. It looks and acts satisfied. If in doubt, you can weigh the child before and after the nursing.

Table.

In the first day, four or five nursings, 5 grams each.

In the second day, six to eight nursings, 15 grams each.

In the third to eighth day, eight nursings, 25 to 60 grams each.

In the eighth to twentieth day, eight nursings, 60 to 90 grams each.

In the second month, six nursings, 100 to 120 grams each.

In the fourth to ninth month, five to six nursings, 160 grams or more each.

During the day put the baby to the breast every two and one-half to three hours. After 9 p. m. let the baby sleep as long as it will. Before nursing it, should it awake, see that diaper is dry, or let it cry awhile, since it may not be hungry, but will go to sleep again. After awhile it becomes accustomed to be nursed in the day and to sleep all night or with one awaking. This can almost always be accomplished in three weeks. The child should not be disturbed between times for any other reason than attention to itself.

Contra-Indications to Nursing by the Mother.

1. General Diseases. Tuberculosis. Experience teaches that the disease takes rapid growth, that a previously latent tuberculosis may now become active.

Severe Anemia. Not necessarily a contra-indication. With good and full diet, patient recovers rapidly and may nurse.

Syphilis. If the child be healthy and mother diseased. If the child is infected during its passage through the vagina, no objection to nursing.

II. Malformations of the Breasts. (1) Sometimes the nipples may be so deformed that the baby cannot grasp them. By the use of

a nipple shield this may be removed. Operations on the nipples to make them suitable for nursing have not been successful. (2) In mastitis nursing must be stopped, this almost always cutting the inflammation short. (3) Cracks (only a few days till they heal).

III. Diseases of the Child. (1) Malformations, e. g., hare lip. Or the fetus may be too weak, i. e., premature.

Syphilis. If the mother is infected, with the child, no objection; and if the child alone is infected experience has shown that the mother acquires certain immunity against infection. Not allowable to put a syphilitic child to a healthy wet nurse. Widerhofer says, however, that they do not always get syphilis.

Patient's Toilet.

Every morning she receives a general sponge bath, warm water with perhaps a little cologne water in it to make it more refreshing. This should be given when the room is warm and partly under a sheet. If she is restless in the evening, repeat it, as she will sleep better afterwards. It is advisable also to change the night dress before the patient goes to sleep. She should keep her hands clean and aseptic, should not get them infected with lochia, as she may carry the infection to the baby's cord or mouth, or to her own breasts, and cause mastitis.

The room should be large, well ventilated, light, so that you can see the patient and the patient receive some sun. May be darkened when patient is to sleep.

The Pulse and Temperature.

The nurse should take the pulse and temperature, and respiration, morning and evening at least. About 8:30 a. m. and 7 in the evening. If some severe operation has been done temperature taken T. I. D., 7 a. m., 4 p. m. and 9 p. m., or every four hours, as after laparotomy. The pulse may be counted frequently during the day and the temperature taken should it show any marked increase.

Some patients are very nervous about their temperature, since the knowledge of puerperal fever is widespread among the better classes. Little ostentation, therefore. The pulse is of more importance than the temperature in the prognosis of diseases and of the puerperium, but the temperature gives more certain information as to disease, being not so mobile as the pulse. A rise above 100 degrees F. is pathological. The pulse should not rise above 100 to the minute. Even this rate is somewhat suspicious.

The same rules about the pulse obtain in obstetrics as in general medicine. One is often able to tell from the simple feeling of the pulse whether the patient is well or not.

The patient should lie on the back for 24 hours after labor, espe-

cially if an operative delivery, and then may turn to one or the other side, but always slowly and with the legs well together. She should not sit up, except in rare cases to aid urination, and then not bolt upright, but half way, bolstered up with pillows.

After the eighth day, if everything has gone well, she may sit bolt upright in bed to her meals. On the twelfth day she may get to the sofa. She must stay in her room for two weeks and may be allowed to go downstairs toward the end of the third week. Much will depend on the condition of the patient, the progress of involution, the condition of the lochia. If bloody, she should not get up so soon. Not hard to keep above rules and the patients do so much better when they are observed that you must come as close to them as possible.

The Doctor's Visit. He should have a certain method to go through, so as not to forget anything.

There are 12 points that he must learn at each visit:

1. Countenance. 2. Tongue. 3. Bowels. 4. Urination. 5. Sleep. 6. Diet. 7. Temperature, morning and evening. 8. Pulse, morning and evening. 9. Breasts. 10. Uterus—height, size, tenderness. 11. Genitals. 12. Lochia. It is usually not difficult to get the information necessary A visit is usually made within 12 hours after labor. Subsequent visits are generally a personal matter with each physician. Some physicians make visits on the first, second, fourth, sixth and tenth days; others, first, fourth and tenth. It is well to make daily visits to your puerpera and certainly if a hard operation has been done. Then every third day.

ATTENTION TO THE BABY.

1. Bath. Old and fixed custom to bathe the baby every day. There are many objections to this, e. g.:
   1. Baby gets cold and blue, unless bath very carefully given.
   2. Danger of infection of the cord, eyes, etc.
   3. Various eruptions on the skin due to soap and water.

Better to oil the baby for the first week or until the navel is healed.. Simple olive oil or lard applied with the hand, and wiped off with a soft linen towel, daily. Hands and face may be washed in the evening with soap and water.

Dressing the Cord.

Binder changed every day or as often as it becomes soiled. The dressing of the cord is not disturbed unless soiled, when it is soaked off in 1-2000 $HgCl_2$, a new dressing of boric gauze applied, dry. Should it show any signs of moist gangrene, a dressing of alcohol. 50% is put on for eight hours, then removed and the cord dressed

as before. If still moist the next day, dress with sterilized starch. After the cord drops off the wound is dressed as usual.

Care of the Eyes.

Every morning the lids are washed with saturated boric solution and a few drops allowed to run into the eyes, from a bottle, not fingers. If baths are used, nurse to be instructed not to allow any fluid to get into the eyes. Greatest gentleness to be exercised.

Attention to the Bladder.

Urine is almost always passed in the first 12 hours. If not, examine to see if there is any congenital deformity of the parts. If the baby does not urinate it is generally due to some cause other than obstruction. Either the child has gotten too little fluid or it has some form of febrile affection, usually sepsis. A tight foreskin almost never the cause. If the baby does not urinate, a warm bath may be given. An application of warm compresses to the pubis. Only in the rarest cases have resort to the catheter.

Attention to the Bowels.

Unless there is some deformity of the anus, no attention necessary. The meconium is generally discharged in the first 12 hours, but may not come for two days. A few drops of castor oil (gtt x) are sufficient. The parts around the anus do not get excoriated if the mother nurses the child, but with artificial feeding it is almost the rule.

Excoriation is prevented by absolute cleanliness, frequent changes of the diaper. Use of ironed diapers free from dried urine, strong soaps and alkalies, oiling the parts, then gently drying them without friction, and moderate use of a powder of stearate of zinc.

The baby's mouth must be washed every morning with boric acid solution. Must be done gently, since rough rubbing may rub the epithelium off the gums, especially at the posterior parts, where the pterygoid processes are, and cause superficial ulcers, Bednar's Aphthae.

The clothing of the infant should be simple, warm and should allow free motion to the limbs and chest.

Baby's temperature to be taken morning and evening, and accurate record to be kept just as of the mother.

SENIOR NOTES

SENIOR NOTES.

THE PATHOLOGY OF PREGNANCY.

It is not surprising that a function which causes such marked general and local changes as conception and gestation, should not be completed without the production of conditions that might be considered pathological. Pregnancy does not confer immunity to any disease, rather it makes the women susceptible to certain general diseases and almost always aggravates existing general, and especially local, affections. Only seldom do we hear that patients feel better during pregnancy than at other times, and not a few suffer great discomfort or even serious alteration of function.

The diseases of pregnancy may be divided into:

1st. Those of the mother;
2nd. Those of the ovum.

Of diseases of the mother we have, first, general diseases, and, second, local diseases (those of the uterus and decidua).

Of general diseases we have, first, those which are entirely accidental to pregnancy, e. g., smallpox, grippe, syphilis, etc.; second, those which are due to an exaggeration of the conditions induced by pregnancy, e. g. hyperemesis gravidarum, kidney of pregnancy —the various anemias, etc.

Of diseases purely local there are local inflammations, of which endometritis is the most common.

The diseases of the ovum are divided into:—

1. Diseases of the Fetal Envelopes, Chorion, Amnion, Placenta.
2. Diseases of the Fetus itself, e. g., syphilis, monsters, etc.

After this should be considered the development of the ovum in abnormal places, i. e., Ectopic Gestation, and finally the interruption of pregnancy before the natural termination i. e., Abortion.

The general diseases incident to pregnancy show themselves most commonly in the nervous system, the kidneys and the blood. The nervous system of a pregnant woman is like that of a child—hyper-excitable, and external irritants are more keenly felt. All the functions of a pregnant woman are in exaggerated action, and failure of any one has more serious consequences than usual.

Of all diseases the expression of aggravated normal conditions, hyperemesis gravidarum claims first consideration.

HYPEREMESIS GRAVIDARUM.

Nausea and vomiting to a more or less degree occur in 60% of pregnant women and are considered normal. They may be so marked as to become serious and deserve the appellation "pernicious," leading not seldom to abortion or death, or both. It is difficult with a given case to tell when the vomiting passes from the normal to the pathological. Other names for the disease are, uncontrollable vomiting, pernicious vomiting, incoërcible vomiting of pregnancy.

Paul of Aegina observed the disease but Mauriceau in the 18th century, called attention to the danger of the affection. Simons, in 1813, was the first to interrupt pregnancy and with success. Paul Dubois in 1852, before the French Academy of Medicine, presented a deep thesis on the subject, which is still classical.

It is said that Charlotte Bronte died of this affection. Multiparae suffer twice as often as primiparae from hyperemesis, a noteworthy fact, because the ordinary vomiting is much more frequent in the latter.

The disease usually begins in the second month, more rarely in the fourth month, but may appear in the sixth month. Seldom after this. If later suspect Nephritis. It lasts from six weeks to three months, usually, but may take such a violent course as to be fatal in two weeks. It may also intermit for a few weeks, then recur, growing better, then worse.

Symptoms.

Begins insidiously; a slight nausea and vomiting in the morning, gradually becoming more frequent during the day. One of the first signs of the nausea and vomiting having become pathological is the loss of appetite. Vomits everything—nausea almost constant, and there is a loathing for food, vomiting and retching at the sight or mention of it. Or a change in the position of the person will start the vomiting. Continues at night and the patient has no sleep.

Hiccough sets in and may be a troublesome symptom. Pyrosis is sometimes marked, retching causes great weakness and fatigue. Patient becomes restless, irritable because she loses her sleep. Great thirst. General prostration.

Vomit first composed of undigested food, mucus and a little bile: afterward mucus and bile; finally it may become bloody or "coffee grounds."

The blood comes from the stomach, or from the mouth or pharynx. As the disease progresses the pharynx becomes red, inflamed, an important symptom, significant for treatment. Ptyalism has been noted. Constipation is marked, but rarely there is diarrhea, former preferable. Patient complains of pain in the epigastrium, boring in character and constant. Tenderness is found on palpation.

The urine is diminished, high colored, may have albumin and casts and diazo-reaction especially as the disease progresses. Evidences of cloudy swelling and degeneration of the kidneys. The temperature rises in the bad cases, or may remain subnormal till shortly before the end. The pulse quickens, may be to 120, and loses strength. The skin is hot and dry somewhat scaly, resiliency lost, of a waxy color, somewhat gray and sometimes jaundiced. Extremities usually cold, eyes hollow. Emaciation is variable, most often is marked, but the patient may die from exhaustion or toxemia without losing all the panniculus adiposus. In some cases the loss of flesh is so pronounced that the patient has a scaphoid abdomen, which allows one to trace the course of aorta and its bifurcation. A case is recorded where 45 pounds were lost in six weeks—over a pound a day.

If the disease progresses, the symptoms aggravate. The tongue is dry, hot or cracked, the gums spongy or bleeding, the breath is offensive, sordes appears. The patient is somnolent, at times delirious. The pulse goes to 150-170. Fever of a continous type and emaciation continues and the patient may die under the symptoms of uncontrollable vomiting and acute starvation.

Toward the last the vomiting may cease. Remissions in the disease occasionally occur, the interval being weeks or days.

Dubois divides the symptoms into three stages, but the boundaries are not clearly definable. The fetus is usually alive during all this disturbance till shortly before the death of the patient. If the disease is due to toxemia, the cause may kill it sooner, when the vomiting may cease and abortion occurs. Or at the height of the symptoms abortion occurs, when the patient may get well, but sometimes the spontaneous interruption of the pregnancy does not save her, and the same may be said of artificial abortion, though a favorable result is common.

Again, suddenly, without definable cause the woman may demand food, retain it and proceed to recovery. This has been noted at the time of quickening. These cases show the psychic influences in the disease. The vomiting may be absent, a constant and depressing nausea taking its place.

Causation.

There are four classes of cases:

I. Those in which the vomiting is a reflex from the genitalia.

II. The vomiting is due to disease of the stomach or some abdominal disorder aggravated by pregnancy.

III. Where the nervous system is at fault.

IV. Where a toxemia is the underlying cause.

I. There is no doubt of the reflex excitability being increased during pregnancy. This can be demonstrated by examination of

the cutaneous and tendon reflexes. The close connections between the genitalia and the stomach, per the sympathetic and vagus, make reflexes in this arc easy. The tendency to vomit when pressure is made on the ovary is a common example. The genital tract can furnish a host of irritants, so that various conditions may cause this reflex.

(a) Oldest theory. Excessive distension of the uterus more rapidly than it can bear, especially if the wall be hardened e. g., metritis, or if the stretching is abnormal, e. g., hydramnion, twins.

(b) Theory of Grailly Hewitt. Displacement of the uterus, especially ante and retroflexions, especially if the fundus is caught under the pubis or sacrum. Reflex is caused by the pinching of the nerves, or the uterus not being able to expand. Of course this would be enhanced by pathological conditions of the uterus and adnexae. This cause is not rare—and it may be proven by the effect of treatment, as the lifting of the uterus up and holding it in place with an air pessary stops the nausea and vomiting.

(c) Bennett's theory. Chronic cervicitis, with or without erosions. Local treatment sometimes curative.

(d) Schroeder & Veit. Chronic endometritis. Many other pathological conditions of the genitals may be adduced as causes and several may coöperate.

II. That class of cases where no lesion of the genitals is demonstrable, but a pathological condition may be found in the stomach or neighboring organs. Such causes are gastric ulcer, gastritis, carcinoma, tubercular peritonitis, etc. Pregnancy coming on one of these conditions is not unlikely to make the vomiting pernicious.

III. When these two classes are not causative the nervous system is interrogated. Ahlfeld (Lehrbuch der Geb., 1900) says the vomiting is due to circulatory disturbances in the brain similar to seasickness.

Hysteria is not a rare cause of vomiting and it may be fatal. It is in these cases that we see magical effects of treatment through suggestion. A "nervous" tendency will aggravate any existing cause.

Brain lesions, tubercle, other tumors and meningitis have been found. Polyneuritis, especially of the pneumogastric, has been found at autopsy, but this is perhaps the effect, not the cause, or perhaps an effect of a common cause.

IV. Toxemia. Recently a poisoning of the blood has been held accountable for numerous pathological symptom complexes. Bouchard believed he proved the toxicity of the blood and the theory has

been useful in explaining many of the complications of the puerperal state. Recently Bouchard's conclusions have been called into question by German experimenters. This will be considered later.

Many cases of vomiting in pregnancy can be best explained on the assumption of a toxemia; appropriate treatment relieves them promptly. (Lindeman, c. f. allg. Path. u. Path. Anat. 1893, Bd. 3 Nr. 15.)

Uremia may cause vomiting, though it is more common later in gestation.

Diagnosis.

This is more difficult than appears on first thought, as it consists:

(a) In the diagnosis of pregnancy, which is not so easy in the first trimester, when the vomiting almost always begins; (b) The diagnosis of the adjuvant cause of the vomiting; (c) The determination of what stage the patient is in, i. e., the gravity of the case.

The diagnosis of the cause is not always possible. Malpositions of the uterus, disease of the cervix, neighboring organs almost always to be discovered, but endometritis, etc., not. Diseases of the stomach may be affirmed, but nervous and hysterical vomiting are hard to be separated. Toxemia is easier. Pay attention to the four classes of causes, and examine the patient from head to foot carefully, also blood and urine. Make the premises broad, take sufficient time and you will almost always make a working diagnosis.

The three stages of the disease are as follows:

1. Vomiting after food whenever taken.
2. Vomiting continuous irrespective of food in the stomach, fever begins, emaciation, pulse rises, patient very sick.
3. Vomit bloody, patient usually prostrated, continuous fever, extreme emaciation, jaundice, delirium, usually death. The diazo-reaction in the urine said to indicate a severe form of emesis.

Prognosis.

The outlook is serious, the mortality ranging from 20% to 50%.

The disease may terminate:

1. Recovery without abortion, and this, too, when the symptoms have been very severe; change may be sudden or may be gradual.
2. Recovery after abortion, artificial or spontaneous.
3. Death before abortion (or during abortion).
4. Death after abortion, spontaneous or artificial.

If due simply to pregnancy, and not to a pathological condition existing before pregnancy, the prognosis is good, few fatal cases being reported. Prognosis bad if due to some organic lesion of the stomach, kidneys or brain which is aggravated by pregnancy. Pa-

tient may die from rupture of the bowel from constant retching; from starvation, in delirium; from the shock of an abortion. Patient may die of acute exhaustion after apparent improvement. Hard to give per centum, because men's ideas of uncontrollable vomiting differ.

Treatment.

Recognize the cause, elimination of which cures the patient. Since this is not always possible, a certain treatment may be laid down to be followed in all cases: I. Hygienic. II. Medical. III. Gynecological. IV. Obstetric.

Hygienic—Usually you will treat the case as a mild one for awhile, but when you have judged it pathologic, place the patient on her back, in bed.

Isolation—Alone with the nurse. Darken the room. Vomiting may be ocular in origin. Laxative if necessary or an enema. Direct patient's attention from herself. Therefore rest in the horizontal position. Isolation, regulate the bowels.

Diet—In pregnant women the appetite is capricious. Longings for things formerly indigestible. If the desired food is digestible, let her have it. Dr. Meigs waked patient up early—gave coffee and crackers and then patient remained in bed an hour. Small amount of quickly digestible food, e. g., peptonized milk, peptonized meat juice, bouillion and cracker, soft boiled egg, juice of clam, oyster soup, egg lemonade or iced milk. Champagne sometimes settles the stomach. Given in the horizontal position, they sometimes may be retained, or the stomach tube may be tried.

If vomiting is constant, give the stomach a rest—complete. Somatose may be given. Rectal alimentation; peptones—fluids: dextrin; peptonized milk—oz. vi.—at each injection, and not oftener than eight or six hours. Diarrhea may increase the trouble and stops the treatment..

Suggestion—Since the vomiting is so often a neurosis, or is on a neurotic basis, suggestion may be of value. Many of the means here recommended act in this way and the physician is justified in using its full power.

Medical—No specific for this disease. Host of remedies used with apparent success and dismal failure, which shows that there is no specific and that cases terminate frequently spontaneously. Remedies of four classes:

1. *Local anesthetics.* Hydrochl. of Cocaine, gr. 1/8 in oz. 1 of water. Has little influence in the bad nausea and vomiting, but may help to retain some food for awhile. Menthol gr. 1/8 to 1/2, in water. Volatile oils, peppermint, wintergreen. Cracked ice swallowed whole may relieve thirst.

2. *Mechanical.* Drugs. Bismuth, Oxalate cerium, etc. Digestive ferments do not act as well as in the non-pregnant state. Claims made for Ingluvin. When gastritis or atonic dyspeptic symptoms appear, Tr. Nucis Vomicae and Hcl, especially if alcoholic basis. Usually as the disease gets worse, drugs of more harm than good.

3. *Depresso-motors.* Bromides, Chloral, Morphia, in order named, given in large doses by rectum—dr. ss of Na. Br. Chloral in egg water every eight hours.

Morphine, gr. ¼ hypo., once; effect is apparent but may increase the nausea. Give Atropia with it. In some cases of centric vomiting alcohol has a good effect. Dry Champagne or brandy. If it is retained may go on with other food.

4. *External remedies.* Ether spray and pressure on the stomach. Warm flannel band tightly around the stomach. Fly blister to epigastrium. Ice bag of Chapman to the spine (a long, cylindrical ice bag), or a blister to the fifth or sixth cervical spine. Electricity is of little use.

Kaltenbach has warmly recommended washing out the stomach for Hyperemesis Gravidarum. In certain hysterical cases it does great good, and may in gastritis also. Certainly might be tried, unless the patient is too weak, as it is depressing.

5. *Salt solution .7%*, injected subcutaneously, is a valuable addition to our means for meeting the loss of body fluids from the constant vomiting. A quart may be injected every day or several times a day.

The extremities may be wrapped in wet towels, and inunctions of oil or lard used, some of these being absorbed.

Gynecologic Treatment.—Examine carefully.

1. Replace the retroposed or ante verted uterus and retain with a tampon or a balloon pessary. Replace in genu pectoral position. Mechanical irritation may cause abortion.

Anteversion—the same treatment. This causes vomiting usually early in pregnancy. Lifting up the uterus will then stop the nausea and vomiting at once. The knee chest posture may be used as a routine procedure.

2. Erosion or Ectropion of the Cervix. Bennett.

In some cases no change can be seen, but it is routine to treat the cervix anyway, with a 10% $AgNO_3$ solution. Bennett himself used carbolic acid and iodine. M. O. Jones introduced $AgNO_3$, but Marion Sims improved the treatment. Now $AgNO_3$ used entirely.

Wash out the vagina with tepid water, Ferguson speculum, pour oz. 1 of 10% $AgNO_3$ solution. Let it stay until the mucous membrane is whitened. Don't repeat more than three times, at intervals of 48 hours. Rationale not fully understood in cases where no ap-

parent pathological change. It improves many cases, perhaps chemical action on the great cervical ganglion; or it starts a reflex, or perhaps it is psychic. Apply the treatment faithfully. Cocaine locally not as good.

3. Mechanical dilation of the cervix. Copeman's Method.

In 1875 he saved a patient near death and has found that in the majority it succeeded in bringing relief complete or partial. Index finger, or if there is no dilatation, Hegar's dilators. Don't go beyond No. 12 in primiparae—in multiparae, No. 14. Rationale also obscure, may be new reflexes.

Owing to the danger of sepsis great precaution necessary and to the danger of abortion it is necessary to leave this till the last. If this does not succeed, abortion only remains.

Similar to Copeman's method is packing the cervix with gauze. In some cases it will stop the emesis. Done likewise just before inducing abortion.

4. *Obstetric Treatment.*—There is great difference of opinion as to this operation. Germans are very conservative, but they don't have much of this disease. The larger one's experience grows the less inclined he is to abortion, which may be due to greater skill in treatment. Abortion will not always stop the vomiting if due to some other cause than pregnancy, and may not even do so if due to pregnancy alone. Cohnstein found abortion cured in only 40% of cases. Later statistics are better—75% recoveries.

Delicate question in diagnosis. *Always* consultation. 1st, to verify your diagnosis, 2nd, to share responsibility. Two physicians draw up paper and with husband sign it—good to have in case of litigation. Avoid all secrecy. When shall you do it? Very difficult to say. Always before the febrile state, before vomiting is bloody, before patient so weak that you fear she may die under operation. Pinard says after pulse has gone above 100 induce abortion. If there is a great loss of weight and a marked absence of panniculus adiposus, abortion. Best method is rapid dilatation and emptying of the uterus at one sitting.

Hyperemesis is sometimes feigned so as to mislead the accoucheur into performing an abortion. The patient will exaggerate and falsify statements of her symptoms. In all cases the objective signs only should be relied upon.

The milder cases of vomiting have the same etiology and may be treated along the same lines as Hyperemesis.

PTYALISM.

Salivation is a rare complication of pregnancy. It is related to hyperemesis in that it is probably reflexly caused. Hippocrates noted it as one of the symptoms of pregnancy. It is to be distin-

guished from the "cotton-spitting" described by Dewees as one of the signs of pregnancy.

Salivation usually occurs with the nausea and vomiting, but may occur alone. It begins usually in the second month and ceases about the fifth, or at quickening, but it presents the same variations as the vomiting.

It almost always ceases with parturition, but has continued for a few weeks. It usually occurs but once, but may appear in successive pregnancies and may be absent in one and recur in the next.

The flow varies in amount. Excessive quantities are reported, over two quarts a day. It usually lessens during the night, but may continue unabated. The saliva is very watery, tasteless, odorless, limpid, not acid; it has no ptyalin. The patient cannot swallow it, it nauseates.

The loss of this large amount of fluid, the absence of digestive power, and the loss of appetite, not seldom compromise the nutrition of the patient and a condition resembling that produced by incoercible vomiting has proven an indication for terminating the pregnancy in these cases.

There are no changes in the mouth or gums. The salivary glands may be a little swollen, and there is sometimes a little gastric catarrh.

The patients feel miserable, are always thirsty, have difficulty in talking, and the chin may be excoriated. They feel exhausted if the flow is marked.

The causes being analogous to those of hyperemesis, the treatment is along similar lines. Toxemia has been emphasized as a cause. K I. Atropine, Pilocarpine are usually prescribed. The last is the best of the three—gr. 1-7th, hypodermically, repeated five or six times in two or three days. The best results have been obtained with the bromides. Give NaBr., gr. xv t. i. d. by mouth or per rectum if it causes vomiting. Milk diet when toxemia is the cause.

Salivation may occur in other conditions beside pregnancy, e. g., cancer of uterus (Montgomery).

GINGIVITIS.

The slight tumefaction and hyperemia of the gums so often observed in pregnancy may be aggravated to a severe affection. Sponginess of the gums, hemorrhages into them, even loosening and dropping of the teeth occur. There is no fetor, or salivation, and there is usually no pain in the parts, though mastication is difficult. There is no periodontitis.

It begins about the fourth month, usually persists, is even aggravated after labor by lactation. The molars are usually not affected. It occurs oftener in multiparae, and in those who have bad teeth or

care for the mouth poorly. Said to be due to toxemia (Talbot, of Chicago). Occurs in other conditions than pregnancy; e. g., bad teeth, heart disease, etc. When giving mercury this condition is to be remembered.

Treatment.

Hygiene of the mouth. Care of the teeth. Wash of Pot. Chlorate. Tr. Myrrh, dr. 1 ad oz. viii, water.

THE ABDOMEN.

Women often complain of digestive disturbances. These require the same treatment as in other conditions. Constipation causes most of them. Pain in the abdomen is a frequent symptom. It may be due to stretching of the walls—use albolene to help this. It may also be due to traction on the ribs by the recti muscles at their insertion. Support abdomen.

A full colon (coprostasis) tympany unusual distension (twins, etc.), pelvic congestion associated with large varicose veins, old peritonitic bands (e. g., from appendicitis, pelvic peritonitis, etc.), fibroids and other tumors, umbilical hernia,—these are some of the causes. Treatment, remove the cause.

TOXEMIA.

This term has obtained very general usage, though little is positively known of the conditions it represents. It means that the blood contains toxines, of an alkaloidal nature, leucomaines or similar to these. These toxines are supposed to be the result of deficient general metabolism, or these same abnormal processes occurring in a special organ, as the liver, the kidneys, the thyroid; again, the poisons are supposed to come from the fetus, the placenta, from abnormal chemism occurring here. As a result of the deficient action of some organs of the body, e. g., the liver, the kidneys, the thyroid, these poisons are retained in the body, or they are not sufficiently oxidized or changed so as to be rendered harmless.

Such is the theory, and to explain why and how these changes originate we have other theories. It is believed that a neurasthenic basis exists for them; that, "owing to a neurasthenic habit the organism fails to adapt itself, both in the matter of circulation and of internal metabolism, to the changes of function incident to pregnancy."

The toxines may come from the intestinal canal, so-called "intestinal auto-intoxication." The liver does not arrest or elaborate the poisons as it should.

Veit says the transportation and dissolution of syncitial elements of the placenta produce syncitio-toxins, which, if not properly met by anti-bodies in the patient's blood, act injuriously.

Bacterial action is also said to cause the toxemia,—plausible but lacks proof. Albert says that endometritis, infective in origin, makes toxins which, absorbed, may cause toxemia, hyperemesis, even eclampsia. Some cases seem to favor belief in this theory.

The name of Bouchard is most often associated with these studies on auto-intoxication, for he has done a great deal of work on the subject. He sought to prove a relation between the toxicity of the blood and the urine, deficient excretion showing increase in the former. Animals into which filtered urine of pregnant women was injected had convulsions and died, autopsy showing the same conditions observed in the human.

These conclusions have been questioned very recently, and our knowledge is, therefore, not positive, so that for the present the subject will be left as it is. For practice it is not unconditionally necessary to have every theory proven. The general applicability is sometimes proof itself.

We recognize many groups of symptoms which can be satisfactorily explained by this theory of toxemia and treatment directed in appropriate lines is successful in relieving the conditions.

Of the symptoms, those referable to the nervous system are most prominent: Headache, dizziness, neuritis, neuralgias, lassitude, sometimes melancholia, aberrations of the special senses, of taste, of smell; flashes before the eyes, seeing colored lights, amaurosis, somnolence, muscular twitchings, general pruritus, nausea, vomiting, salivation, pain in the stomach, thirst, constipation, sometimes alternating with diarrhea, colic, dyspnea, cardiac palpitation, pseudo-syncope, symptoms of a "forme frust" of Basedow's disease; cough, without pulmonary findings, and asthmatic attacks; diminished urination, burning during the act,—these are the main symptoms of the toxemia. Sometimes one, again another, set being in evidence. On examining such a patient, deficient action of the excretory organs will first be discovered. The skin is muddy, dry, inelastic, and there is sometimes a distinct and characteristic odor. In bad cases there is a sub-icteric hue; sometimes edema without albuminuria. The tongue is coated, somewhat brown in the middle. The mouth is somewhat dry, the gums are red. Sometimes there is a gingivitis, fetor ex ore. The temperature may be elevated, but usually not much, and when there is fever it is irregular, atypical. The pulse is, in mild cases, not affected, the tension may be a little greater; in severe cases, the heart beats faster, and in the worst cases the heart is seriously affected—running 140 to 180 beats in the minute. The condition of the heart is analogous to that of the

adynamic fevers,—muscle degeneration; first sound loses booming quality. Abdominally, there are few findings. The liver sometimes enlarged and tender, usually there is tympany, and the colon may be full. The urine is scanty, of variable specific gravity, often low, the color is deepened and cloudy; usually there is no albumen, except in bad cases and late; there may be sugar, an alimentary glycosuria, and perhaps peptone. The urea is diminished, often less than .3%, this forming a fairly reliable indication of the excretory activity of the kidneys and liver. Total solids, too, are often far below normal. Leucin, xanthin, indican, urobilin, have been found. Various organic (sometimes alkaloidal) substances, of narcotic, convulsive, hypothermic, cardiac poisonous qualities, are found in normal urine.

Microscopically, in mild cases, there is nothing abnormal. Later, hyaline casts, then granular and epithelial casts and cells appear. If the poisonous matters continue to irritate the renal parenchyma, the signs of the kidney of pregnancy appear and in the last stages even those of acute nephritis. The "uro-toxic coefficient," i. e., the amount of urine necessary to kill 1 kilo of rabbit, is increased.

The toxemia has a noxious effect on the fetus and the secundines. The child may be poisoned by the toxines which come to it per the placenta, and may die in utero, or be born weakly, or develop convulsions (in eclampsia of mother); or the hemorrhages which not seldom occur in the placenta may cause its death by asphyxia. Autointoxication, as a cause of placental hemorrhage, is being accepted.

Prognosis—Depends on the cause. If the liver is at fault, treatment may be successful. If the kidney, likewise; but if there is antecedent structural disease in either, guarded prognosis.

Treatment—Prophylaxis. Get history of pregnant woman for hereditary liver, kidney or nervous disease, or some antecedent of this kind, e. g., icterus catarrhalis, neurasthenia, nephritis (scarlatina, etc.). Examine the urine every three weeks till the seventh month, then two weeks, but the signs of toxemia in the urine are usually later than the symptoms. Watch all pregnant women for the symptoms throughout pregnancy. Keep all pregnant patients on a diet of such that will not irritate the kidneys or liver; plenty of water, milk, buttermilk, all kinds of vegetables, cereals; very little meat, not more than once a day; few eggs, not more than one a day; a little fish, not too freely of sugar, no fried starches (e. g., pies, thick pastry).

Pay attention to the bowels and see that the patient passes sufficient amounts of urine. Wool clothing to keep skin normal. No circular body constriction, baths, fresh air, moderate exercise.

When diagnosis of toxemia is made, put patient at once on a milk and water diet. Open bowels with salines (no potash salts); give patient daily warm baths followed by rest in bed, so that she

sweats freely. When symptoms subside, a more generous diet is to be tentatively resumed.

In bad cases, put patient to bed, milk diet, daily hot packs, saline cathartics; hypodermically Oiii .7% saline solution daily. Salt solution per rectum. If you fear that the toxemia is of a pre-eclamptic nature, give patient gr. x Chloral Hydrate t. i. d.; may give more without danger, as toxemic cases stand twice as much as others.

THE KIDNEYS IN PREGNANCY.

It is generally admitted that during pregnancy the point of weakest resistance is the kidneys. Owing to the greater demands made on it by the increased general metabolism, and the addition of a new source of excretory matters (the fetus), and the interference with its functions by the change in the intra-abdominal conditions, it is not at all surprising that its structure should suffer, that inflammatory processes of a low grade be inaugurated, and that existing diseases of its structure be intensified.

It is, therefore, apparent how necessary frequent and careful examinations of the urine are, but one should not expect to read the condition of the kidneys from the urine alone in all cases. The ancients noticed the occurrence of edemas in the pregnant woman. Albumen first shown in the urine by Blackhall, in 1848; in 1849 Blot showed that it is most often transitory, and defined the conditions in which it is found.

Schroeder found 3 to 5% of pregnancy cases had an albuminuria, not much more than in the normal non-pregnant state. Greatest precautions were taken. Other authors show higher percentages, but this is due to admixture of mucus or discharges from the vagina.

The importance of the albumen in the urine has been exaggerated. A physiological, at least, a harmless, albuminuria, can be said to exist when:

(1st) It is slight in amount.
(2nd) Absence of casts and renal epithelium.
(3rd) No symptoms of involvement of the kidney or ureters, such as dropsy, uremic symptoms, hydronephrosis, anuria, etc.

Fischer, of Prague, found in a large number of healthy pregnancies, white blood corpuscles, and often red blood corpuscles, and ureter and bladder epithelium; even a few hyaline casts, in the urine. In general, however, it is better to regard all albumen in urine as suspicious; and watch the gravida carefully for symptoms of eclampsia, etc.

CAUSATION OF THE RENAL DISTURBANCES.

The majority of authors refute the idea of a special inflammation of the kidneys, due to the pregnancy, but say that morbid conditions of the pregnant woman can cause changes in the kidneys bordering on inflammation.

Kraus, of Vienna, said that a low grade of inflammation would explain the condition best (this caused by some form of toxemia).

The *oldest view*, that of Frerichs and Rosenstein, that there is a venous congestion due to the pressure of the pregnant uterus on the veins of the kidneys, or on the kidneys, impeding their circulation.

Not generally admitted, because albuminuria may occur early before any such pressure possible, and, further, even at term the uterus does not press upon the kidneys. The pressure of the gravid uterus is but very little more than the intestinal mass.

There is no doubt as to the existence of a venous hyperemia, but this cause is obstruction to the venous circulation, because of the great increase in the intra-abdominal tension. In support of the latter view, we can adduce the following:

(1) Albuminuria, and renal disturbances in general, are more frequent in primiparae because of tense abdominal walls.

(2) In great abdominal enlargement, from twins, hydramnion, pregnancy with tumors, etc., we find them more often (conversely, the absence of these symptoms make the occurrence of twins, etc., unlikely).

(3) In the non-gravid state, large abdominal tumors will sometimes cause albuminuria; in these tumors, however, there may be pressure on the veins because their specific gravity is somewhat greater than that of the intestinal mass, and they are often adherent in the pelvis.

(4) After the evacuation of the uterus symptoms usually disappear.

Second theory, that of Halbertsma, that compression of the ureters by the gravid uterus causes stasis of urine. A slight pressure is enough, but this can occur only in the early months, and after the head had gotten into the pelvis late in pregnancy. Serves to explain a few cases possibly. It has been denied that the uterus can compress the ureters.

Third theory, that of Traube—Changes in the blood incident to pregnancy. Kidney is supplied with poor, watery blood, therefore, fatty degeneration of renal epithelium. Not accepted, since the changes in the blood are not so great as formerly thought and the "hydremia of pregnancy" has been shown to be rare.

Fourth—Spasm of the renal arteries, therefore, fatty degeneration (Cohnstein). Merely hypothetical.

Fifth—Increased work of the kidney during pregnancy. Plausible. Seems possible that a kidney overworked would suffer, especially if it were previously affected, e. g., by chronic Bright's disease or infectious diseases.

Sixth—That the changes are due to an auto-intoxication. Some noxious products of an "intermediate metabolism" affecting the structure of the kidney.

It is now quite generally believed that the kidneys in pregnancy are easily affected by the poisons which they are called upon to eliminate. If altered by antecedent disease, the poisons that should normally be eliminated may alter its structure. If the liver action is insufficient, the products of its own, and the general metabolism, the poisons absorbed from the intestine, are not prepared properly for excretion by the kidney, which, therefore, suffers in integrity. The toxins (for such these under-"metabolized" substances become), accumulate in the system, rendering the liver still further inefficient—a circulus vitiosus being formed.

PATHOLOGICAL ANATOMY.

We must distinguish sharply between inflammatory conditions and those which are simply due to pregnancy. Here great difficulty arises, especially clinically.

I. *The kidney of pregnancy*—(By this term we must understand those changes in the kidney which occur in a previously healthy organ simply as the result of pregnancy).

The kidney is large, pale, cloudy; markings obliterated; contains small amount of blood. *Microscopically*. Fatty changes in the glomeruli and tubules, but no signs of inflammation. Changes due to ischemia. After labor, the changes disappear. Until now it has not been demonstrated that a kidney of pregnancy can be the starting point for a chronic inflammation of the kidneys. Cases which tend to prove this view are almost always to be explained by a non-recognized kidney trouble existing before pregnancy and aggravated by pregnancy. If an acute nephritis supervenes, it may be followed by the chronic form.

The changes in the urine in this form of kidney are—specific gravity, normal, may be slightly increased. Normal in amount; little albumen, ¼ gm. to litre, white blood corpuscles, ureter and bladder epithelium, a few fatty renal epithelia, hyaline tube casts, and perhaps a few granular casts; urea less—1¼ to 1½%. Later, oliguria and numerous casts, but now it begins to be pathological.

II. *Various Forms of Bright's Disease:*

Chronic Interstitial Nephritis—Cirrhosis of the kidney, accompanied by concomitant affections, e. g., Hypertrophy of the heart, hard pulse, large amount of watery urine of low specific gravity.

Chronic Parenchymatous Nephritis—Changes similar to that of kidney of pregnancy and hard to differentiate, clinically.

In general, the effect of these lesions by pregnancy is to intensify them. Eclampsia is more likely to occur.

III. *Acute Nephritis*—The worst complication of the kidneys. Urine scanty, high specific gravity, red in color, cloudy, blood and sometimes blood casts. White blood corpuscles, casts of all kinds. Convulsions occur in a large per cent.

Nephritis during pregnancy is more likely to occur if the patient have recently had some acute infectious disease, e. g., scarlatina, variola, measles. Part played by the kidneys in these diseases now known to be much more important than formerly believed. Further, exposure to cold and wet increases tendency, or poor living. Still find cases of eclampsia among the well-to-do.

Symptoms—The kidneys of pregnancy seldom make symptoms of gravity, save a more or less marked edema; the urinary findings have been mentioned; they are similar to that of chronic parenchymatous nephritis.

Primiparae are oftenest affected by this condition, and it begins usually in the later months of pregnancy. While symptoms of renal insufficiency are mild or absent, the presence of edema and albuminuria should put the physician on his guard, but such symptoms may develop suddenly, upon a slight, perhaps unrecognized cause and rapidly bring a fatal outcome, through eclampsia, premature detachment of the placenta, etc.

Should the symptoms of a case in which the diagnosis of the kidney of pregnancy had been made, aggravate the case had better be considered as one of nephritis and so treated.

Acute nephritis is an occasional sequel to the kidney of pregnancy, and when it occurs almost always has eclampsia as a symptom. The cause of this complication may be exposure to cold and wet, especially if there has been antecedent septic disease, scarlatina, etc.; various toxic influences, particularly toxemia of pregnancy, previously considered.

These conditions may develop a latent chronic nephritis, especially the chronic parenchymatous, making it impose as a new disease of the kidneys, unless its previous existence be known. Rarely can it, during pregnancy, be proved to have existed before.

The symptoms of an acute nephritis and of an acute exacerbation of a chronic nephritis are: Edema and puffiness of the eyelids and ankles or wandering edema, which appears even when the

patient is lying down, in distinction to the edema of venastasis, which is better when patient assumes the horizontal position. The anasarca may be general and is sometimes enormous.

The labia vulvae are sometimes as large as one's wrist, and translucent. Hydroperitoneum and pleura may occur. Pallor, or pasty color of the face, especially in chronic forms. Arterial tension is increased. The lungs may become edematous and cause death. The breath may be urinous. Symptoms of urinemia, or of toxemia, the terms being practically synonymous, appear early, and in some instances quickly lead to convulsions. Headaches, neuralgias, pain in epigastrium, disorders of the special senses, spots and flashes in the field of vision, partial or total amaurosis (without retinal findings), dizziness, deafness, tinnitus aurium, delirium, nausea and vomiting, but, above all, the occurrence of convulsions, eclampsia. (See toxemia.)

Other symptoms are, diarrhea, dyspnea, local palsies (due to edema of parts of the brain), general pruritus, numbness and tingling of the fingers, cramps in the muscles, especially of the legs.

The urinary findings have been given. They vary with the intensity and acuteness of the disease. In acute nephritis there is more blood than in the chronic parenchymatous. See books on general medicine for further study.

Chronic interstitial nephritis is characterized by the large amount of watery urine with low specific gravity, little albumen, very few casts, low urea percent.; hypertrophy of the heart and increase in arterial tension and thickening of the vessel wall.

The many symptoms of urinemia or toxemia already mentioned may appear, especially as the pregnancy advances, when the distinction between the various forms of nephritis becomes blurred. Retinitis albuminurica is more common in this form than the others.

The influence of pregnancy on chronic nephritis, therefore, is bad. It may light up a latent and aggravate a chronic inflammation of the kidney, and it often hastens death, even when eclampsia does not occur. Repeated pregnancies are especially bad, the condition becoming worse each time, to remain so in the intervals. Labor, also, like any severe operation exerts a noxious influence on the kidney. Post partum hemorrhage is favored.

In the puerperium, even, the danger is not past because sepsis, although mild, may produce renal insufficiency and nephritis cannot bear infection well.

Anemia is badly borne by women with nephritis. On the other hand, the influence of the nephritis (and this includes the kidney of pregnancy, too), on the pregnancy is a bad one. Abortion and premature labor are common.

This is brought about—

(a) By the hemorrhages, which are so commonly found in the placenta in these cases. These sometimes cause numerous white infarcts and sclerosis of the blood vessels, which cut off the fetal circulation, "placenta albuminurique" of the French.

(b) Premature detachment of the placenta, which jeopardizes both lives greatly.

(c) The accumulation of urea, or perhaps better, the toxins, in the fetal blood, poison it, and its expulsion follows sooner or later. These poisons may irritate the uterus and bring on contractions, and finally

(d) The occurrence of eclampsia often terminates the gestation.

The Prognosis of all forms of nephritis is bad, both for the mother and child. The kidney of pregnancy usually disappears after labor, and unless something is added to it, offers a good prognosis, though, as was said, the condition needs close watching, especially as the diagnosis may be wrong, a more serious lesion underlying mild symptoms. It is safest to consider every case where there is a moderate amount of albumen or casts, even though few, as pathological.

The main dangers of nephritis are, eclampsia, edema of the lungs, hydro-pleura,—pericardium, enormous anasarca, retinitis albuminurica (often leading to permanent blindness). This condition, appearing in the course of a chronic nephritis, means that the patient cannot survive more than two years.

For the child the prognosis is bad for the reasons already given.

Treatment—Prevention better than cure. A nephritic should not marry, and if married, should not conceive. If a woman has had eclampsia in her first pregnancy, but has gotten well without symptoms of a permanent change in the kidneys, there is no danger usually in the next pregnancy, since she may have had simply the kidney of pregnancy, which, as was said before, has not been proven to result in chronic nephritis. Any symptoms of chronic nephritis existing before pregnancy should direct your attention to the kidneys, and this emphasizes the need of careful examination of the urine.

A cure can rarely be effected during pregnancy. Best that we can do is to tide the patient along till the end of pregnancy, or at least, till the fetus is viable; and then induce premature labor.

Only real curative treatment is abortion. Statement is questioned by some.

Treatment is:

1. Hygienic.

II. Medical.

III. Obstetrical.

Hygienic—Diet—Limit nitrogenous foods, make the diet largely of milk and starches. No meats or eggs. Alkaline water to drink. If necessary, i. e., if no improvement, absolute milk diet.

Clothing—Should be warm and woolen, even in summer, so as to keep up a perspiration, but the patient must beware of catching cold.

Bathing—Systematic use of the hot water pack, or bath. Jacquet's wet packs, or the alcohol packs, or a vapor bath—the funnel introduced under the bed clothes and an alcohol lamp.

Danger of abortion from the hot bath may be avoided by giving gr. xxv of Chloral before it, or gr. ¼ morphine.

Bowels—Kept freely open with salines.

II. Medical Treatment—Very little value in medicines. Treatment the same as that for the non-pregnant state, e. g., alkaline diuretics (no potash salts), or Tr. Ferri Chlor. or Infus. Digitalis.

Cathartics—Jaborandi and Pilocarpine—Dangerous, since if they do not produce sweating they depress the heart, or they may cause edema of the lungs. If the patient has a convulsion, or is comatose, the drug sometimes causes such a profuse secretion of saliva that this obstructs the air passages. In general, it is not to be used.

III. Obstetric Treatment—A faithful application of the previous remedies may often prevent the case from coming thus far, but if in spite of daily hot baths, or the Jacquet pack, renewed thrice a day, and the hygienic regulations—the dropsy increases, a tendency to sleep indicates the approach of coma, cerebral symptoms develop; it is time to end pregnancy.

Experience proves that if the pregnancy comes to an end in a large majority of cases, the symptoms subside, to a point they had before the pregnancy or but slightly worse.

WHEN TO INDUCE ABORTION.

"When, in spite of the absolute milk diet, hot packs or baths, the edema increases, uremic symptoms (headache, visual disturbances, intestinal symptoms, etc.) persist or increase, after at least eight days' treatment, may induce abortion." Since these conditions occur more frequently in the latter months, the case usually needs premature labor.

Simplest and safest method of inducing labor is the hot water bath without drugs. The other methods we will take up under Operative Obstetrics.

THE CHANGES IN THE BLOOD.

Pregnancy alters the blood in healthy women (see 1st year notes). If a woman is anemic, chlorotic, the condition is likely to be exaggerated during pregnancy. These women are usually sterile: if they conceive they often abort. They stand labor and especially post partum hemorrhage poorly, and they often cannot nurse their children, either no milk or poor.

Pernicious anemia may develop during pregnancy; it may result from a chlorosis, though this is not proven. The theory that poisons developed during changes incident to pregnancy, of a hemolytic nature (as studied by Quincke and Peters), alter the blood, appeals to me. The vomiting and digestive disturbances of the early months may cause anemia, and lay the foundation for graver diseases. Chronic auto-intoxication from coprostasis is said to be causative.

Premature labor is almost always caused by the affection, probably the result of fatty degeneration of the placenta and decidua.

The patient may die during labor from hemorrhage, which need not be large, or the disease may progress so rapidly after labor that it is quickly fatal. No case survived two years (P. Muller).

Perhaps arsenic and bone marrow may save more of the cases. Artificial termination of pregnancy has delayed the fatal end in but few instances.

Leukemia sometimes begins during pregnancy, and has likewise a deleterious influence on this function, while the latter aggravates the former. Hemorrhage during labor is especially dangerous. The child may be leukemic. The treatment of these blood diseases is identical with that of the non-pregnant state. The interruption of gestation is seldom indicated, unless in the interest of the child. The white blood corpuscles do not pass over into the fetus. If the disease is recognized very early abortion is sometimes justifiable. Hemorrhage during delivery is to be strenuously avoided. Lactation must be forbidden.

Hemophilia is a rare complication of pregnancy; in women, only one in thirteen cases. Menstruation may be free. It does not usually disturb the pregnancy, but all hemorrhage is likely to be profuse, post partum hemorrhage especially, and sometimes fatal. Bleeding sometimes occurs from the nipples during nursing, or from the genitals.

The disease may not be known to exist till a pregnancy supervenes, or it may develop after several labors, or even in the menopause, and then lead to fatal end. The cause is unknown. Either the blood vessels do not contract or the blood does not clot. The

coagulation time of the blood is undoubtedly increased. Heredity is almost always determinable, but there are cases which are acquired.

Treatment—During pregnancy give iron, arsenic. Calcium chloride (gr. xv t. i. d.), during the week before labor, and gelatine freely in the diet. Have everything ready for post partum hemorrhage—gelatine and gauze for packing uterus, etc.

Morbus maculosis Werthofi, occasionally complicates pregnancy. The prognosis is not good, although abortion is seldom. Hemorrhages during gestation may so weaken the woman that a slight bleeding during labor may prove fatal. It may occur during the puerperium, and may be transmitted to the fetus. The role of the adrenal glands in these hemorrhagic diseases needs study.

THE PELVIC JOINTS.

The softening and relaxation of the pelvic joints, especially of the pubis, referred to in the physiology of pregnancy, may increase to such an extent as to become pathologic. Toward the end of gestation pains are experienced about the pelvis, especially at the joints, and soon extending down the thighs. Locomotion becomes progressively more difficult, in the worst cases the patient being bedridden. The pains are worse the longer the patient is erect. While there are no paralyses, the patient cannot abduct or adduct the thighs without pain. The pubes are tender to touch and one can usually feel a groove in the joint and riding of the bones when the legs are moved, both on internal and external examination. The malady increases until labor, then quickly disappears, but the patient may be a little slow in getting up. It is likely to reappear in subsequent pregnancies. It may lead to spontaneous or traumatic rupture of the pubic joint during delivery.

The treatment is rest, and a tight pelvic girdle, though little relief is obtained until after delivery.

The second class of diseases during pregnancy—those which are entirely *Accidental.*

In general, pregnancy aggravates diseases which occur; further, the pregnancy itself is endangered by them. Acute febrile diseases constitute the first and more important class of diseases under this head.

The exanthemata; measles, typhoid (may be reckoned here); scarlatina, especially variola, have a very deleterious effect on pregnancy, in a large per cent. abortion occurring. It is not true that pregnancy confers immunity against these diseases, as was formerly supposed. On the contrary, an increased tendency to acquire the disease in a prevailing epidemic has in a few cases been recognized.

There is a tendency for all these diseases to become hemorrhagic which clouds the prognosis. There are often profuse menorrhagias which are called pseudo-menstruation, or epistaxis uterina. Possible that some of these are early abortions.

The action of these diseases is two-fold:

1st. They may directly interrupt pregnancy by a hemorrhagic endometritis. This has influence, first, according to the time of its occurrence (bad if early); second, its site (worst if in the decidua serotina); and third, its extent.

The death of the fetus may be the result of this endometritis.

2nd. They directly endanger the woman by the complications, e. g., hemorrhage, high fever, and puerperal diseases they induce or favor, e. g., influenza favors sepsis. A woman exhausted by disease is in bad condition to stand abortion or labor.

The death of the fetus may be brought about in various ways. Not all to be mentioned are positive, however.

1. The fetus may die from *insolation*.

The fetus has, of course, the same temperature as the mother, and since it has its own heat regulating apparatus can react to stimuli coming from the mother. Normally, the temperature of the fetus is a little higher than that of the mother (½ degree F.). The fetus has not the means to accommodate an excess of temperature, by evaporation, so that a rise of temperature is less well borne.

The fetus is, therefore, more susceptible than the mother, and this is especially true of *sudden changes*. A rise to 104 is dangerous for the fetus, and if it continues for any length of time, the fetus usually dies, and then abortion follows. If the rise is very gradual, the fetus may stand it longer.

The movements of the fetus are first increased, the fetal heart tones also, later both get slower and the fetus dies. Experiments on rabbits have shown that a very gradual rise of temperature to 109 is not necessarily fatal. If sudden, always fatal. On the human there are no clinical data other than those given.

2. Pregnancy may be interrupted by too early uterine contractions, elicited by the hot maternal blood circulating in the uterus. Theory considered doubtful by some authors. Still, the use of the hot douche is advised to hasten labor pains (Winckel).

3. The fetus may die of asphyxia. This may be brought about in various ways:

(a) The weak heart of the mother may not be able to propel the blood to the uterine sinuses, therefore low blood pressure, or the low blood pressure, may result from severe maternal hemorrhages.

(b) There may be a large hemorrhage in the decidua serotina.

(c) The febrile process may have caused such changes in the chorionic villi that the interchange of gases is much interfered with. The condition is one of fatty degeneration of the villi.

How far this is in connection with the endometritis is not certain.

4. The fetus may acquire the disease from which the mother is suffering. The placental wall offers no hindrance to the passage of toxines from diseases, but the passage of bacteria requires some lesions of the wall, which is not hard to find. Numerous micro-organisms have been known to pass through.

The typhoid bacillus, the pneumococcus, spirillum of relapsing fever, streptococcus, staphylococcus, bacteri coli communis have been demonstrated in the fetus.

The fetus has had a chill in utero and been born with an enlarged spleen, "ague cake." Likewise, smallpox can affect the child, it being born pock-marked. Vaccinia, also, the new born not being susceptible to vaccination. It has not been proven that scarlet fever, cholera, erysipelas, rabies, tetanus, can pass over to the fetus, though for some it seems highly probable.

The effect of these diseases on the mother is variable. Pneumonia is bad, because of the difficulty in respiration, the strain of labor may prove too much for the already overburdened heart and lungs. If labor comes on (which should be prevented if possible), it should be terminated as quickly as possible. The respiratory difficulties may be so great that it is necessary to terminate pregnancy, though this is itself a risky procedure and may defeat its own purpose.

Influenza may act like a pneumonia and requires the same treatment. Some epidemics are more fatal than others, e. g., Hintze reported eight cases with three deaths, and pus with pus germs were found in the uterus. The cases may be mild and the child may be affected, too. Occurring in the puerperium it may simulate puerperal fever (if it may not directly favor it). Treatment, on general principles.

SEPSIS.

May occur during pregnancy. Cases are not rare where women are infected in the last month; the labor is soon evoked, and the child is almost always dead. The writer believes that infection, at this time, from coitus, the examining finger, douches, etc., is more common than is generally believed, and that this fact sheds an important light on many of the complications of labor and the puerperium.

Albert holds this view and says that the infection may be older,

LANE MEDICAL LIBRARY OF
STANFORD UNIVERSITY
300 PASTEUR
PALO ALTO CALIFORNIA

may date from a previous labor, or an endometritis that has been present for years.

GONORRHEA.

The importance of this infection is getting wider attention each year. That it can cause sterility in both sexes is certain; that it can cause abortion, and premature detachment of the placenta, has been asserted. It may cause sepsis post partum. (See path. of the puerperium.)

The so-called "puerperal rheumatism" may be a gonorrheal infection of the joint. Acute gonorrhea during pregnancy, profuse discharge, greenish, condylomata acuminata, Bartholinitis, salpingitis, peritonitis, dysuria, etc.

Treatment urgent because of complications of puerperium and ophthalmia neonatorum; 1/1500 permanganate of potash douches, painting vagina with 20% argyrol sol. light tampon of iodoform gauze, etc.

TUBERCULOSIS.

This has a marked influence on the genital function of the female.

First. Menstruation, in advanced cases, is usually suppressed. This is due to the weakness of the constitution, the conservative efforts of nature or to atrophy of ovaries, or to some local tubercular trouble in the genitalia.

In the beginning of a tuberculosis the menses often become irregular and scanty, as occurs often in chlorosis, and the hard diagnostic problem may arise. Beginning tuberculosis or chlorosis? The tuberculosis perhaps is the cause of the other. Leucorrhea is often a symptom in tuberculosis and there need be no local affection, this taking place instead of the menses.

Sterility, fortunately, is not rare in tuberculous subjects. Due to the same causes as the amenorrhea, but the influences are only observed in advanced cases.

During *pregnancy* only rarely does abortion occur, a little oftener premature labor. Still, in a large per cent. of cases the pregnancy goes to term, and the patient may die during the labor, but usually unless in the cases near death anyway, there is no trouble. Post partum hemorrhage, hemorrhage of the lungs, edema of the lungs, have been noted as complications. Pregnancy does not confer any immunity on women against tuberculosis as was formerly thought. Indeed, the tendency to become tubercular, if there is any taint in the family, will be developed now.

An existing tuberculosis is sometimes apparently benefited, but after labor the disease makes more rapid progress, the caseous deposits soften and break down. The reason the tubercular tendency remains latent till puberty or gestation, is not known; also, it is not understood why these should have such deleterious influences.

The disease sometimes makes rapid progress during pregnancy. During the puerperium, involution proceeds normally. Lactation is likely to be insufficient, and if the woman nurses the progress of the consolidation is very rapid. Hectic often develops.

In Regard to the Fetus—The undoubted transmission of a tendency to the tuberculosis is hard to explain.

That the tubercle bacilli can pass through the placental wall is now quite certain, for animals as well as man but cases of congenital tuberculosis are very rare. They are always from the maternal side, though it is certain that in advanced tuberculosis bacilli are expelled with the semen.

The fetus is apt to be poorly developed, but exceptions to this are not uncommon, large and fat children have been born of emaciated mothers.

Clinical fact that children of tubercular parents are not so hardy as others, they die of tubercular meningitis, intestinal diseases. A certain number die of tuberculosis, which they acquire from the mother's milk. This point is not definitely proven, but there is a high degree of probability.

Women with tuberculosis should not marry—first, because this aggravates their own disease; second, they may infect the husband; and third, they propagate tuberculous children. Same is to be said of the husband.

If the tuberculosis is latent, or if they possess only the hereditary taint, the question is more difficult, but it is only exceptionally that the doctor's advice is asked. Knowing the tendency for a latent tuberculosis to break out in pregnancy, marriage is to be forbidden. If the woman marries she should avoid conception. Finally if she conceives she should not nurse the baby. The disease makes great progress during the puerperium, especially if the woman nurses.

During pregnancy, expectant treatment unless some severe symptom arises, e. g., very rapid consolidation, pulmonary hemorrhage, to which the tendency in the latter months is increased. Abortion is rarely indicated. May be necessary to induce premature labor, though rarely, and denied by some authors. The weight should be taken weekly, and if there is a steady gain danger is seldom present. During labor the patient should not be allowed to suffer longer than necessary. Caesarean section, post mortem, has been frequently done in cases which die in pregnancy or labor.

SYPHILIS.

This disease is of the greatest importance to the Obstretrician. The disease is quite common. Ricord says that in Paris one in eight is syphilitic. In the U. S. the conditions are much better, but still one must expect the cases frequently. There is no doubt that there are a good many cases which are not diagnosed. We have to consider syphilis as it manifests itself from the mother, and secondly from the father. The former is more important as it affects the fetus more deeply; the latter is important in that it may show itself after all the manifestations of the disease on his part may have disappeared. Limit of safety has not been determined, given from 4 to 12 years after appearance of disease. (See Rosinski on syphilis.)

In general, syphilis is graver in the pregnant state than in the non-pregnant. Primary and secondary lesions are usually observed, as, owing to the age of the patients, tertiaries have not developed. The chancre is more voluminous than ordinary, hypertrophied, vascularized, and softer, because of the general softening of the parts, whether pathological or normal.

The glands are enlarged more than usual, and are painful. There is, also more of a tendency to suppuration. The length of persistence of the primary lesion is greater, 10 to 12 weeks being the average.

The eruptions on the mucus membranes and skin are also more marked. The eroded papules are very numerous on the vulva (Fournier). "They develop with a singular exuberance, take on quickly a granulating condition, hypertrophy, and often constitute veritable tumors which invade and deform the entire vulva. Further, they are always more rebellious to treament, being reabsorbed slowly and with difficulty. The ulcerating syphilides are very frequent in pregnant women, livid, purple, excavated, which is increased by the general tumidity of the parts. They persist longer and have a tendency to become phagedenic."

General Symptoms—In pregnancy, the general symptoms are aggravated by syphilis. The anemia is more profound, troubles of digestion more marked, neuralgias, headaches, insomnia, much more common. Neuralgias beginning shortly after marriage often point to syphilis. Eclampsia and urinary troubles are not more frequent.

Labor may be influenced by syphilis. It is said that the pains are more painful due to exaltation of the nervous system.

A chancre on the cervix may impede the delivery, and there is a secondary manifestation of syphilis in the cervix, a thickening induration of the tissues which render dilatation much more diffi-

cult, sometimes impossible, necessitating incisions, craniotomy, etc. Has been fatal.

Friability of the perineum is sometimes observed, especially if there are condylomata. The perineum may tear like wet paper. The puerperium shows a rapid healing (with treatment) of the florid lesions. There is a slightly greater tendency to infection from the lacerations, the general ill-health, etc.; there is no real syphilitic fever, which has been asserted.

Post partum hemorrhage is not more frequent. The placental site is often thrombotic from death of the fetus. That syphilis can produce a blood dyscrasia similar to hemophilia has occurred to the author as probable.

Maternal—Syphilitic women are often sterile,—reason not known; may be ova are no good.

The effect of maternal syphilis on the pregnancy is marked, but varies with the age of the syphilis and the treatment instituted.

1. Syphilis contracted before pregnancy.

In these cases usually a series of abortions occurs, each one later than the last; later, premature labors, the fetuses either born macerated or dying a few hours or days after birth. Finally, living children at term, which show sooner or later the signs of hereditary syphilis, or with treatment grow up. This course of events can be broken if the proper treatment be instituted.

Rarely healthy children are born of a syphilitic mother without treatment. These cases are of *old, mild syphilis.* It is not known how long it takes virus of syphilis to become attenuated, so that living, healthy children may be born. The longer the syphilis, the more the likelihood. Somer reports a case of syphilis in a child 10 years after the infection.

Ruge says 83% of repeated miscarriages are due to syphilis.

2. The woman acquires the syphilis at the same time she becomes pregnant:

Abortion is the rule, unless vigorous treatment is given, from the start. Even here the child is usually lost, which must not weaken our efforts to save it.

Subsequently, the cases are the same as No. 1.

3. The syphilis is contracted during pregnancy. If early it usually leads to abortion. If in the last two or three months, the fetus escapes in about one-half of the cases and is born healthy at term. In very rare cases the fetus may become inoculated during its passage through the genital tract, but then the case is one of acquired syphilis.

If the child is born alive it is immune to primary syphilis, the poison having been absorbed while in the uterus. Thus it may nurse a syphilitic mother and not be re-infected.

In the same way a syphilitic child may infect its mother. The mother may thus develop secondaries without any primary chancre being formed.

The syphilitic spermatozoid has infected the ovum, the mother escaping while the child is developing.

Paternal Syphilis—Influence not so important, still is marked, and is harder to understand.

1. When the husband has florid primary or secondary lesions and infects the wife at the same time as he impregnates her. Here it is impossible to separate the results of the paternal and maternal syphilis. Abortion is the rule.

2. The more common case is: the husband has had syphilis and has been treated more or less thoroughly several years before his marriage. At the time of the impregnation he has no infective lesions. The child is usually, but not always, syphilitic, or it may show signs of syphilis later in life, at the time of puberty. The mother may escape entirely, or be infected from the child through the uteroplacental circulation.

If the syphilis be more recent in the man, the woman may abort or have premature labor, with a macerated fetus. If you treat both man and woman, the subsequent children are born alive.

An interesting condition arises here. The woman has a syphilitic child within her. Does she become syphilitic? No, and yes. No, because she has no signs of the disease; yes, because she cannot be infected with syphilis, and responds to treatment, as is shown by healthy children later.

In rare cases the patient may show signs of secondary syphilis without any trace of a chancre. These are cases of syphilis by conception.

SIGNS OF SYPHILIS ON THE FETUS.

1. The characteristic change in the epiphyses described by Wegner. The line of ossification is broader with irregular edges and points running into the cartilage. There are small islands of bony matter off to the side in the cartilage and the whole epiphysis is yellower. In advanced cases the part is swollen, the periosteum thickened. The condition is said also to occur in congenital rachitis. This is denied by the majority of authors, and again, rickets is excessively rare. The diaphysis breaks off easily. In mild cases the change may be moderate, and sometimes even in normal cases the line of ossification may be a little wavy. Therefore, it may be hard to distinguish.

2. The liver and spleen are larger. Ordinarily the proportion of the weight of the liver to that of the body is one to thirty.

The spleen 1 to 300. In syphilis the weight is increased three and even four times.

3. The lungs may present gummata, or a peculiar interstitial infiltration, which is characteristic of syphilis or a catarrhal inflammation, called white pneumonia, incompatible with respiration.

4. Changes in the skin. Bullous eruptions—exfoliation of large areas, condylomata, etc.

5. The placenta is larger, heavier, fatty—presenting the macroscopical and microscopical changes, to be considered under the pathology of the placenta.

6. If the child lives, it may be affected with pemphigus and other skin lesions, the hemorrhagic diathesis, icterus gravis, and then the usual evidence of congenital syphilis.

Treatment—Now, no doubt about the propriety of treatment during pregnancy. Instituted early, it may prevent abortion; and always tends to cure the disease. So that here, as usual, the indication is to treat syphilis vigorously. Methods the same as ordinarily given.

In cases of repeated miscarriages with definable cause, it is a good plan to give the mother mercury throughout the pregnancy—gr. 1/50 $HgCl_2$ three to four times a day.

Nursing—Shall a syphilitic woman nurse her child? Where the patient has presented signs of syphilis, she may nurse her child, even if the child show no signs of syphilis. No case is on record (Fournier) where a syphilitic mother infected her own child. Where the father is syphilitic, the mother free, the proper one to nurse the child is the mother. (Law of Colles.) In certain cases a wet nurse has been employed and there has been no infection, but do not assume the responsibility. Recommend the careful supervision of the lips of the baby for "patches" in all cases.

Do not put a syphilitic child to a healthy wet nurse. Parvin says it is criminal.

HEART DISEASE IN PREGNANCY.

Pregnancy is accompanied by enlargement of the heart, a hypertrophy, for which there are many reasons; general increase of all of the body functions, increased intra-abdominal tension, increase of the total amount of the blood, and in the area of the circulation (placental circulation), uterus and pelvic organs larger, and the increase of the weight of the body.

Larcher, in 1826, showed the increased weight of the heart to be one-fourth to one-third, in autopsies on 130 cases of puerperal women. Blot, in 1862, came to the same conclusions.

The Germans, following Gerhardt, believe there is little, if any,

hypertrophy; that the enlargement is only apparent, due to the lifting of the heart by the diaphragm and its being pushed forward, the chest becoming shallower.

That there is at least a slight hypertrophy of the left ventricle, most authors believe.

The diseases of the heart may be divided into those which were present before, and those which develop during, pregnancy and the puerperium. Pregnancy may occur with all forms of cardiac disease. If the heart is doing its work well it may meet the additional demands satisfactorily; of the disease is advanced, if the heart is in a condition of unstable equilibrium, especially it there is myocarditis, the danger of lack of compensation is present, and of a degree in accordance with the conditions.

Pregnancy is often, one-fourth of the cases, interrupted, and usually in the latter half, due to pelvic congestion; hemorrhage, venosity of blood, coughing, death of the fetus.

Pregnancy not seldom disposes to an acute exacerbation of a chronic endocarditis, and with this sometimes a fatty degeneration of the papillary muscles, with, of course, bad effect on the compensation.

Kidney disturbances are invited, and to all this may be added the respiratory difficulty, due to overloading of the pulmonary circulation. The high position of the diaphragm does not decrease the trouble, and as a result of all these causes, transudations in the pleurae are not rare. Compression of the lungs, hypostatic pneumonia, hemorrhage, edema pulmonum, are sequelae. Dyspnea, sometimes very marked, palpitation, cough, edema, ascites, and the usual symptoms outside of pregnancy, show the lack of compensation, and this may lead to the development of serious conditions which may demand obstetric interference during gestation. Myocarditis cases are especially apt to prove unequal to the test of pregnancy, and sometimes, too, fatty hearts.

During Labor—There is danger from not fully compensated hearts. Uterine action increases the arterial tension, and straining —bearing down—increases both arterial and venous pressure. Then, too, the fluctuations of the pressure are hard on the heart. Symptoms of a laboring organ appear, or the heart may suddenly prove default, and collapse, edema pulmonum, and death ensue. If the heart holds out till after the baby is born, the circulation may be established rapidly, or, in not a few cases, sudden death in collapse may occur.

In the Puerperium, some of the patients that recover from the strain of labor grow worse, and die from embolism of the brain, etc., recurring endocarditis, degeneration of the heart muscle, and aggravation of the existing disease, etc.

Fatty heart may cause disturbances of compensation, but usually not unless there be some adjuvant cause, e. g., chloroform, long and hard pains, operations, hemorrhage. During the puerperium it may be the cause of sudden death. Cardiac thrombosis and pulmonary embolism are sometimes the result of heart disease in the puerperal state.

PROGNOSIS OF CHRONIC HEART DISEASE IN PREGNANCY.

The majority of women with heart disease pass through pregnancy and the puerperal state without trouble. If there is good compensation, accidents rarely occur. The worst kind of affection is the myocarditis, and especially if this complicates a valvular defect. Of the valvular lesions, mitral stenosis is the worst; then mitral regurgitation, and, least dangerous, aortic insufficiency.

All depends upon the compensation, which again depends upon the length of time since the deforming disease, the youth and constitution of the woman, the condition of the heart muscle, and of the blood vessels. The integrity of the other viscera must also be taken into account. In general, the usual findings and rules are useful in determining the prognosis in a given case. Von Leyden had 40% mortality in the severe cases. Jaworski 30%, but I think these percentages are too high.

Treatment—Marriage not to be forbidden unless the disease is marked, or compensation is insufficient and unstable. During pregnancy care against strain, catching cold, toxemia, nervous shocks, etc. General medical treatment when necessary.

Obstetrically, expectancy. If the symptoms of bad compensation appear, the question of interruption of gestation arises. When the heart is proving unequal to the task of the advancing pregnancy, labor should be induced; also, when the disease is making such rapid progress that there is reason to fear death will occur during or shortly after labor. Pulse valuable index.

The child is almost always viable, so that its interests do not interfere. The method of election is the rupture of the bag of waters.

During labor, expectancy; almost always there is no trouble, but be ready to interfere at the slighest indication of it. Puncture the bag of waters early, and empty the uterus as rapidly as consistent with the safety of the mother. There is no contra-indication to chloroform in heart disease cases in labor, unless it be a marked myocarditis.

Watch the woman carefully after the baby is born. Keep hand on uterus, and make pressure on the abdomen. Put on a tight binder. Digitalis may be given during labor.

In treating labors in cardiac cases, have everything ready for instantaneous termination of labor on a moment's notice. Have stimulants at hand, including oxygen, and supply of assistants.

The second class of cases are those that develop during pregnancy and the puerperium. It was once thought that a sub-acute endocarditis was peculiar to pregnancy, but not considered any more. Acute endocarditis may occur during pregnancy. Acute myocarditis, and fatty degeneration, may occur during gestation, but they are more likely in the puerperium, as evidences of a septic process, though they may occur alone. Brown atrophy has been found in many cases of sepsis. Fatty degeneration may follow hemorrhages, especially if repeated, and there is observed an acute fatty degeneration similar to Buhl's disease, of the new born.

Cardiac palpitation, without organic disease, but due to nervousness, may be an annoying symptom during pregnancy, even necessitating its interruption. Basedow's disease has some dependence on gestation. There is not much positive interaction between the two conditions.

DISPLACEMENTS OF THE UTERUS.

The uterus is normally anteverted, and during pregnancy (first months) this anteversion is increased. It is very rare that the fundus is caught under the pubis, because the angle which the pubis makes with the plane of the inlet is a little obtuse—105 degrees. Bad symptoms are almost never observed.

Late in Pregnancy, the uterus becomes anteverted, owing to the weakening and relaxation of the abdominal muscles. The condition is called pendulous abdomen, ventre propendens, ventre en besace, Haengebauch. In pronounced cases, the fundus is between the patient's knees. More common in multiparae and it increases with the number and frequency of the pregnancies. Occasionally, it appears suddenly about the eighth month, due to a rapid giving way of the linea alba, and diastasis of the recti.

In primiparae pendulous abdomen is rare, and must always give rise to the suspicion of contracted pelvis.

Causes, are, increased pelvic inclination, weakness of the abdominal walls, lordosis, contracted pelvis, kyphosis, spondylolisthesis, tumors with pregnancy, twins, hydramnion, enteroptosis.

During pregnancy it causes a sense of weight and distension,—dragging pains in the abdomen, in the back and on the insertion of the recti at the chest; intertrigo of lower abdomen and thighs, varices and edema.

Sometimes trouble in urinating, and the protrusion may be so large as to interfere with walking, and household duties. It is spoken of as a "rupture," but is only a wide diastasis of the recti.

During labor the position of the uterus throws the cervix back into the hollow of the sacrum, often high up towards the promontory, and prevents its proper dilatation. The head may not engage, for the same reason, and labor does not progress in spite of strong pains. The mechanism of labor is disturbed. Malpositions are more common, especially breech positions and anterior parietal bone presentations, prolapse of the cord or extremities. Diagnosis of the position of the child is difficult. Ruptura uteri favored.

Treatment—Prevention is important. Care in labor and after.

1. Proper length of time of lying-in.

2. Application of binder. Said that English women owe their good forms to the binder. More probably due to their rugged constitutions and exercise. The binder does more good after getting up.

3. Prevention of gas and fecal matter accumulating in intestines. Gas distends abdominal muscles and prevents their return to the normal state. "High stomach," due to fat, gas, etc., pressed down by corsets. Therefore, keep bowels open before and after labor.

4. Infection, causes it by laming the intestinal walls. Some gynecologists recommend operation, laying bare and uniting the edges of the recti muscles. Not advisable, except in very aggravated cases.

During Pregnancy—Support the uterine tumor with a binder which shall lift it up towards the shoulders. No corsets. Keep the bowels open. Have patient lie on back. This treatment is as much to insure a good presentation as to give patient comfort. The French use a "ceinture entocique," a binder with pads on either side, to keep the child in a longitudinal position and prevents pendulous belly.

During Labor—Pull the uterus upward with a towel over shoulder and hold in place with another around belly. May not be able to feel the head per vaginum till you push the tumor up with the outside hand. The Walcher position may be tried for an hour to facilitate the engagement of the head. King advises to put the patient in a squatting position. The thighs force the uterus up against the abdomen.

Owing to great delay in labor or to danger to the fetus, it may become necessary to apply forceps in head cases. The shoulders may give trouble, the anterior shoulder being caught on the pubis. In breech cases, if there is delay in labor, good plan to go in and bring down the anterior foot. This straightens out the fetus and brings the uterus into the axis of the pelvis, so that it can work to better advantage.

In some cases the diastasis of the recti muscles is so great as to allow the uterus to fall out between them, making a hernia uteri

gravidi abdominalis. The bearing down efforts of the parturient now can be of no effect on the delivery—rather may delay it.

Ante-fixed Uteri—Owing to the general modern operative treatment of displacements of the uterus by sewing it to some part in front, e. g., abdominal wall, bladder, vagina, cases are accumulating of trouble in labor due to the abnormal position of the uterus and the interference with the normal processes of labor. Several distinct, somewhat typical forms of dystocia have resulted from these operations and frequently enough to be considered in a separate chapter.

The cases may be divided into:

1. Alexander operation.
2. Ventro-fixations.
3. Vesico-fixations.
4. Vagino-fixations.

1. *Alexander Operation*—Restores the parts to nearest the normal. Few disturbances have been reported, and these abortions. The shortened round ligaments grow and undergo involution as they usually do.

Sometimes there is pain during the later months of pregnancy. Uterus is free to grow, but in rising it pulls on its ligaments.

Treatment—Knee chest position frequently for the pain, and roborant liniments. Watch for threatened miscarriage.

2. *Ventro-fixations*—Here the uterus is sewed to the anterior abdominal wall. May be in the middle of the corpus, at each side, or the round ligaments may be sewed to it. Of these the last given gives rise to the least trouble. If the peritoneum has been dissected off so that the adhesion is in the connective tissue, the point of fixation does not stretch and give way and a relapse does not occur. If the adhesion does not give or if it is placed too near the fundus, the free part of the uterus dilates, the part adherent does not, and there results a deformity of the uterus, especially the anterior wall. The uterus grows in the breadth, cannot rise high toward the sternum, the posterior wall is thin, the anterior thick, the axis of the uterus cannot be gotten to correspond with the axis of the inlet, the cervix is high, over the sacrum and the mechanism of labor is disturbed.

In 68 cases of labor collected by Lindfors, the cervix was high in 27, transverse presentation in 31, and trouble in third stage in 10. There were 30 versions, 13 Caesarean Sections, 10 high forceps, 5 embryotomies, 5 tamponades for post partum hemorrhage and many other operations necessary. There were three deaths: It is claimed by Lindfors if the operation is properly performed, there is almost no danger of trouble with succeeding pregnancies.

In 146 cases collected by Lapthorn Smith there was trouble 36 times, 10 abortions, 3 deaths. Treatment will be discussed with that of vaginal fixations.

3. Labor after vesical fixation has not been observed.

It would be thought that the gravid uterus in its various movements would draw the bladder into sympathy with it.

4. Vaginal fixation as formerly done gave rise to such severe disturbances in gestation and labor that its performance on young women was discountenanced. Whether the newer method (passing the sutures through the round ligaments) will be free from labor complications, time will show. The anterior part of the uterus being united to the vagina, marked anteversion result with the cervix directed upward towards the promontory. The fundus is fixed on a relatively immovable body (the vagina). The anterior wall of the uterus cannot take part in the dilatation of the uterus, therefore the rest of the uterus has to stretch more. The uterus takes on a peculiar triangular shape with the broad base over the inlet.

During pregnancy, pain in the scar, because the uterus grows away from the scar. Irritation of the bladder; may have to use catheter. Abortion in 25% of the cases, because the uterus is hindered in its dilatation. In some cases the uterus pulls away from its attachments, and then the course of the case is uneventful.

It seems also that the operation hinders conception. As pregnancy advances the posterior wall of the uterus, develops more and more, gets thinner, the anterior wall of the uterus remains where it is and roofs over the pelvis.

The cervix is drawn upward and backward toward and somewhat above the promontory of the sacrum and in this condition we find the parts when labor begins.

During Labor—

1. Premature rupture of the bag of waters.
2. Prolapse of the cord.
3. Abnormal presentation, most frequent, shoulder presentations.
4. Post partum hemmorrhage.

History of a typical case is: Labor pains slow, bag of waters ruptures early, usually tranverse presentation. Ovoid transverse, low down, round ligaments run near pubis. Thinning of posterior wall of the uterus.

Vaginally, roof of vagina smooth, anterior portion drawn up, posteriorly the cervix cannot be felt unless the whole hand is introduced. Anterior lip of the cervix a hard resistant half ring. Posterior vaginal vault and posterior lip of cervix continuous, forming one canal. Cervix at or above promontory. Not all cases are as bad as this, but in the bad ones labor seldom terminates spontaneously. Almost always an operation needed, unless patient dies of sepsis before.

Treatment—If case is mild, can reach cervix, dilate with col-

peurynter, then version and extraction, rarely forceps. May have to make incisions in cervix. Careful in intra-uterine manipulations of the thin posterior wall of the uterus. If roofed vagina impassable, or cervix out of reach or impossible to do a version (the child lying in a pouch anteriorly).

There are three methods:

1. Incisions of the anterior cervico-uterine wall.
2. Vaginal Caesarean section.
3. Abdominal Caesarean section or the Porro operation. If the child is dead embryotomy if possible, otherwise as above.

Posterior Displacements— Retroversion—Rare in nulliparae, but when it occurs, the woman is usually sterile. The same may be said of retroflexion in virgins. In women who have borne children both these displacements are common, but they are very seldom a cause of acquired sterility.

Retroversion of the pregnant uterus seldom remains such, the growing uterus gradually lifts itself up and about the third month, having passed the promontory, the fundus falls forward. The patient knows nothing of it—called *spontaneous restitution*. If the texture of the uterine wall is very soft the uterus cannot lift itself up, the fundus remains in the hollow of the sacrum, the cervix stems behind the pubis, the fundus fills up the pelvis and incarceration results.

Retroversion of the first degree seldom causes any trouble, the uterus rising in the abdomen. When of the second degree, if not abortion, incarceration usually occurs, though here, too, spontaneous restitution is observed. The incarceration occurs earlier than with retroflexion because the uterus is longer. The difference between these two conditions lies in the direction of the cervix, which in the flexion looks downward, in version directly against the pubis. Partial restitution may occur.

In retroversion of the greatest degree, when the cervix looks almost upwards, the same conditions may arise, but incarceration may occur late—fifth, even to the eighth, month, which is due to the fact that uterus really stands on the fundus, this developing toward the pelvic floor, the cervix looking upward ("sursum spectat," Hunter).

When neglected these cases are very bad (of twenty-two women seven died, only six carried through). Hard to empty the uterus under the conditions, because the fundus can hardly get by the promontory, while the cervix catches on the pubis.

Causes of Retroflexio Uteri Gravidi—

1. Retroflexion before pregnancy.
2. Seldom that a sudden increase of the intra-abdominal pressure can push the pregnant uterus back. May be possible when the bladder is full, e. g., coughing, lifting heavy weights, jumping, etc.

3. Pelvic adhesions.
4. Shrinking of the uterine serosa and muscle at the angle of the flexion.
5. Flat pelvis with prominent sacrum, or tumors which act like this.

Symptoms—Same as those of any tumor in the pelvis.

1. Disturbance of the bladder—irritation, incontinence, retention.
2. Constipation, sometimes diarrhea.
3. Bearing down, sensation of fullness and weight.
4. Pains, radiating from sacral and lumbar plexuses.

These symptoms occur before the room in the pelvis has become entirely too small and usually bring the patient to the doctor. Rarely the woman waits till the uterus is tightly wedged into the pelvis.

Terminations—

1. Spontaneous rectification.
2. Abortion.
3. Partial spontaneous rectification.
4. Incarceration under promontory.

I. In the large majority of cases about the third or fourth month the uterus rises spontaneously past the promontory and gently falls forward.

The fibres in the anterior uterine wall, the round ligaments, have mostly to do with this; secondarily, the utero-sacral ligaments. This may take 24 hours and occur between two examinations by the physician. The patient may not notice it. Again, it takes several days, which usually means that there are pelvic adhesions. These are ruptured, stretched or may be even absorbed. Even extensive adhesions may be gotten rid of in this way. The course of the pregnancy is now normal.

How long to wait before interfering? Better too soon than too late. Wait until the third month, and if no signs of ascent—interfere.

II. *Abortion,* has been so frequently observed when the uterus was retroflexed that this condition is believed to be a frequent cause of the accident. Important cause of habitual abortion before the third month.

Interruption of pregnancy due not to lack of room, but to—

1. Disturbance of circulation, the result of the bend, causes uterine contractions.
2. Chronic endometritis result of the congestion causes the death of the fetus by hemorrhage.
3. Chronic metritis—walls harder and irritable.

Abortion occurs at a time when the attachments of the ovum are slight, and weak. Even if the cervix is much displaced the abortion is usually complete. After the abortion or during its progress the

uterus returns to its normal position, so that the lochia have free outlet. If not, the drainage of the uterus may be incomplete, because the fundus is lower than the neck.

III. *Incomplete Restitution*, or Retroflexio Uteri Gravidi Partialis. Here the anterior part of the uterus goes up into the abdomen. Part of the body of the uterus remains in the pelvis and the head may be found in this part. Due to relaxed uterine walls and adhesions too firm. Also to anomalous form of the organ, to contraction of the peritoneum in the angle of the flexion, tumors. Per vaginum find the uterus behind,—cervix high up in front; may be out of reach—above pubis.

This condition terminates—

1. Normally at term.
2. Abortion may occur.
3. The uterus lifts up the remaining portion.
4. Incarceration may occur at about the fifth month.
5. Operation may be needed at time of labor.

Diagnosis—Is usually simple, but sometimes there is difficulty if the positions are not recognized. Bimanual—using the whole hand if necessary, under chloroform or ether. Cervix against pubis or above it. Soft, fluctuating tumor in the cul-de-sac, containing a part of the fetus; soft tumor above the pubis, both in close relation with the cervix.

A condition known as *Sacciform Dilatation of the Uterus* is quite rare. Resembles "partial restitution" but is said to have nothing common in the cause. Vaginally, same conditions found. DePaul had a case, could not find the external os, therefore, punctured the posterior wall of the uterus. Woman died undelivered.

IV. Finally *Incarceration* of the uterus occurs. Here the symptoms of obstruction in the pelvis gradually grow worse.

1. *Bladder*—Because of the dislocation of the urethra, and pressure on it, dysuria, then retention, later bladder overflows, ischuria paradoxica. Every case of dribbling of urine in pregnancy demands a local examination. Each time a little urine is passed there is great pain. Bladder may reach in size that of a uterus at term. Urine dams back into kidneys and may produce uremic symptoms.

2. *Rectum*—Compression causes constipation, later vomiting, even *ileus*. Tympany sometimes great. Patient may die of ileus unless cause is removed. Attended with pains at bowel movement. Pain in back and belly and feeling of great weight in pelvis. Even now there are the following terminations:

1. Spontaneous rectification.
2. Abortion—even when the uterus is upside down.
3. Inflammation (may be primary) of the uterus takes place; all the symptoms are exaggerated; a septic, bloody,

serous discharge came from the cervix. There are pain and symptoms of peritonitis. The sepsis gains entrance from the bladder, direct infection, or during abortion, as the septic urine may be the cause. Perforation of the uterus.

The abdominal muscles contract and may force the fundus down on to the perineum. Rare case, the anus opened and the fundus with small parts appeared, also rupture of the vagina and the uterus has been delivered naked through the rent.

The most important symptom is the retention of the urine. If this occurs very slowly the bladder hypertrophies. If retention persists and catheterization is necessary, or even without this,—cystitis usually results. Rupture of the bladder may take place, or rupture of the mucous membrane. Then the urine extravasates behind the mucosa and may finally separate it completely from the muscularis. Or the constant distension of the bladder causes anemia of the mucosa, which necroses. This anemia is aggravated by pressure of the cervix against the base of the bladder. The necrotic mucosa may be extruded per urethram. The necrosis becomes gangrene when infected, which may come from bowel adherent to the bladder, or from catheterization. Bacterium coli communis.

Death results

1. From exhaustion, sometimes after reposition.
2. Uremia.
3. Ileus.
4. Sepsis, which may come from gangrenous cystitis, rupture of the bladder, peritonitis; may be due to the attempts at reposition, infection of the uterus. Sepsis the usual cause of death.

Diagnosis—Usually easy.

1. History—Pregnancy—symptoms.

2. Abdominally—Feel the distended bladder, elastic and fluctuating, but may be hard, especially if the walls are hypertrophied. May feel like a fibroid (rare). Must always catheterize the patient after first noting the conditions. Neoplasm is shut out by careful application of the diagnostic means.

3. *Vaginally*—Cervix pressed up against or above the pubis. Cul-de-sac filled by a large soft tumor. May feel small parts in it. After emptying the bladder can feel no tumor abdominally, the hands come together with the cervix between and a sharp angle is felt between the cervix and fundus. If there is great pain in the posterior fornix, or if the question of extra-uterine pregnancy in the cul-de-sac or a hematoma, or an incarcerated fibroid or ovarian tumor comes up, it may be necessary to give chloroform.

These are all differentiated by the demonstration of the uterus

in another place. The history of course must not be forgotten in these cases.

Treatment of All Cases.

1. Empty bladder.—Catheterize. Silver male catheter, if rubber unsuccessful. Place patient in Sim's position. Urethra usually drawn to one side—knee chest position. Push cervix away from bladder with two fingers in vagina. Take plenty of time and be extremely gentle. If this not successful, though it usually is, aspirate the bladder, if there are no signs of gangrene. In cases where the retention has been prolonged and great, let the urine off very slowly—make an interval. Reason—

(1) Shock from sudden emptying.
(2) Sudden rush of blood to anemic parts may cause hemorrhage or gangrene.

2. *Rectum*—Give saline cathartics or glycerine enema. Never large enemata because of rupture of the bowel.

3. *Reposition*—If the uterus is not incarcerated, position may suffice. Morning and evening patient should get in knee chest position and let air into the vagina. Stay five minutes. The physician may aid this by pushing the uterus up with the fingers, while the patient is in this posture. Examine again in a week to see if it has gone back. If it has repeat procedure and retain by a balloon pessary. Keep side position in bed. Bowels open, bladder free. Keep pessary until after the fourth month, then remove.

If incarcerated, the uterus cannot be replaced so easily. Sim's position or knee chest, anesthesia, push fundus up, push cervix down, may be with vulsellum. Always push fundus to one side, to avoid the promontory. Not too great force because one may rupture the uterus, or adhesions, or the bladder. Death has been the result of too violent efforts. Watch her after reposition because bladder necrosis may occur.

If reposition is impossible, one may temporize a short time, if the bladder is regularly emptied and there are no signs of cystitis or gangrene (Duehrssen). While waiting the writer would advise—

(1) Knee chest position every four hours, admitting air into the vagina.
(2) The use of a colpeurynter filled with 16 oz. of water.
(3) The use of a colpeurynter filled with mercury, first one pound, increasing gradually. Elevate foot of the bed. If this does not succeed, before inducing abortion laparotomy has been recommended. The writer suggests posterior colpotomy first, letting air under the uterus, then attempt at reposition.

If there is gangrene of the bladder laparotomy is contra-indi-

cated and abortion is almost always necessary. Abortion is done by some when the uterus cannot be replaced by manipulations.

May be unable to pass a bougie into the uterus. Try a steel male urethral sound. If this is impossible, aspirate the ovum through the posterior vaginal wall, with a thin exploring needle. Little risk if aseptic procedure.

After the uterus is reduced in size reposition may be possible, or one can now induce the abortion by dilating the cervix, etc.

Emptying of the uterus must be complete because of the bad drainage. If impossible to do abortion, posterior colpotomy, empty uterus, suture; or total extirpation of the uterus, especially if there is inflammation of the organ.

When gangrene of the bladder has occurred, the bladder should be laid widely open from the vagina. If there is infiltration of the abdominal wall, sectio alta, with through and through drainage. Urotropin.

Treatment—The treatment of partial retroversion or flexion is the same. As these cases advance further in pregnancy mechanical difficulties in delivering the fetus may arise. Version and extraction is the best way, but if the conditions are held well in hand, the vaginal Caeserean section might be the best operation.

THE INFLAMMATIONS.

Pelvic peritonitis rarely occurs during pregnancy. Acute and chronic. Acute from infection, especially criminal abortion, perforation, escape of pus from a tube or appendix, rupture of the uterus, etc. Treatment the same as in other conditions. Must empty uterus in abortion cases even if symptoms of peritonitis are present.

Appendicitis—Symptoms, diagnosis and treatment same as in non-pregnant state.

Chronic pelvic peritonitis, or its relics, adhesions, not rare but not common. Pains referred to pelvis, sometimes displacements of the uterus, with increase of the sympathetic disturbances. Pain may be so bad that the patient is bedridden and needs narcotics. Old puerperal infection, or pelvic inflammation from any source, appendicitis, proctitis, etc., are causes. Missed labor said to be due to this condition.

Treatment—Rest when pain is severe. Abdominal binder. Stimulating liniments to abdomen. Full warm baths. Laxatives, and if absolutely necessary, narcotics.

Metritis—This is still more rare; somtimes due to infection, e. g., from the bladder in retro-flexio uteri gravidi incarcerata, sometimes from extension from inflammation of neighboring organs;

sometimes from infection from criminal abortions. So-called rheumatism of the uterus is difficult to prove. More likely than this is an endometritis (see later). Perhaps circumscribed inflammation of the uterine muscle may explain those cases of rupture of the organ during gestation or labor. (Schroeder.)

Chronic metritis is carried over into pregnancy and causes, sometimes abortion, pain and other discomforts during the period. The "irritable uterus" of the older writers may be chronic metritis.

DISEASES OF THE DECIDUA.

These diseases play an important role in the pathology of obstetrics. Many minor irregularities in the course of labor and especially the third stage can be referred to an endometritis existing before pregnancy.

Endometritis decidua can develop during pregnancy, however. The causes of endometritis in general are quite numerous. Gonorrhea plays an important role. Noeggerath, in 1872, wrote a paper which has been authority till now, that gonorrhea is not curable for several years; that it is communicable even at the end of two years. Irregular living; immoderate dancing, chilling at the menstrual periods, sexual excesses, frequent childbirth, a slight infection or retention of membranes or a piece of the placenta. The decidua is not completely cast off and a new mucous membrane is not formed as it ought to be.

Most frequent causes are gonorrhea and abortion. Abortion is both cause and effect. First, it may be the cause and later the endometritis may cause repeated abortions, a circulus vitiosus being established.

A latent infection of the mucous membrane of the uterus may persist for a long time. Albert (l. c.) brings conclusive proof of this.

Acute Endometritis Decidua—This occurs almost always in infectious diseases, such as variola, scarlatina, typhoid, cholera, trauma and infection from criminal abortions.

The decidua is infiltrated with small hemorrhages (may be large ones), is thickened in places. White blood corpuscles are present in large numbers and one may discover various germs. Leads in the large majority of cases to abortion. If due to infectious diseases the germs may be found in the blood and tissues of the fetus. The fetus dies of the disease and then abortion occurs.

If the disease does not cause abortion it may cause disturbances in the nutrition of the fetus. Occasionally blood and fleshy moles are formed.

Chronic Endometritis—This is much more common, and is very

varied in character. Pathologically there are many varieties, but clinically we distinguish three:

I. Chronic Endometritis-Decidua Interstitialis.
II. Chronic Endometritis Decidua Glandularis.
III. Chronic Endometritis Decidua Syphilitica.

The results of these three are—

1. Sterility (relative).
2. Frequent abortion.
3. Abnormal position of the ovum, shown by the position of the placenta.
4. Inflammatory adhesion of the placenta and membranes.
5. Thickening and retention of the decidua.
6. Abnormal formation of the placenta, shape, thickness, size.
7. Retarded development of the fetus.

In the first of these varieties the interstitial tissues are involved. The decidual cells increase in size and number, numerous white blood corpuscles can be seen between them, the surface may be rough and irregular, from irregular growth, or even a polypoid condition may occur. This is especially true when hemorrhages occur in the membrane, as they so often do. No membrane in the body is so disposed to hemorrhages as is the decidua.

This thickened, hypertrophied, tubercular form of the disease is called *Endometritis Decidua Polyposa.*

Virchow described it and milder forms of it are not rare. The thickening is not marked at the sides of the uterus, in the corner between anterior and posterior walls. Here, on expelled portions, can be seen the openings of the glands.

Symptoms—During pregnancy: pain in the uterus, aggravation of the sympathetic symptoms of pregnancy, especially hyperemesis, painful contractions of the uterus, so-called rheumatism of the uterus, tenderness, malaise, sometimes slight fever, early interruption of the pregnancy. Sometimes there is a bloody mucous discharge, which makes one think of abortion.

The importance of the affection depends on the location, extent and time of the occurrence. If the decidua serotina is involved, early death of the fetus and abortion; if mild, perhaps adhesion of the placenta in the third stage. If great in extent, abortion occurs, or the ovum is changed into a fleshy or bloody mole. The earlier the disease manifests itself, the greater the changes and the more the likelihood of abortion. Endometritis causes placenta previa, and premature detachment of the placenta. If late in pregnancy or mild in character, it may only interfere with the third stage, e. g., slightly adherent placenta and membranes or pieces of thick decidua which

give rise to oozing of blood. These pieces of decidua may have to be scraped off because they cause too great a loss of blood, or they may come away in the puerperium, causing profuse, sometimes fetid, lochia, and prolonged, slowed involution.

On the placenta the evidences of endometritis are, thickened serotina, which may be quite opaque and ragged in places; vascularization of the margin of the closing plate of Winkler, which may extend some distance under the membranes.

The material surface may be rough, sometimes hard, and there are numerous white infarcts. The contour of the placenta may be irregular—as if it grew easier in one direction than another; there is a tendency to the formation of placenta succenturiata, and placentula succenturiata, also velamentous insertion of the cord.

Diagnosis—The diagnosis may be suspected during pregnancy, but even when the symptoms are present, as given, a certain diagnosis may be made only post partum. If the condition is suspected, appropriate treatment must be instituted for the prevention of the evil effects, e. g., placenta previa, premature detachment of placenta, post partum hemorrhage, premature labor.

Treatment—General plan if patient has endometritis in pregnancy, to give alterative tonics, e. g., $HgCl_2$ 1/50 gr. t. i. d., or arsenic gr. 1/50. Rest in bed, especially at menstrual periods. Symptomatic treatment.

II. Inflammation affecting the glands. This disease has received another name from its most prominent symptoms, i. e., a periodic discharge of watery fluid from the uterus; *Hydrorrhea Gravidarum.*

Cause—The cause of Hydrorrhea Gravidarum is very obscure. Gonorrheal inflammation of the endometrium cannot always explain it. It is due to a catarrhal endometritis, the secretion accumulating between the deciduae before their fusion. It is a yellowish, serous, sometimes bloody, fluid.

The fluid comes more or less periodically, may be in gushes or dribble away. Sometimes a large amount accumulates behind the mucous plug between the two deciduae and suddenly gushes out. May simulate an abortion and is often thus explained, or this may even provoke an abortion, or premature labor (rather the latter.) Occurs usually at the fourth month and then the fifth month. Sometimes in the later month 16 oz. may accumulate, and its expulsion may stimulate the uterus to action, or there may be a constant dribble. Might think B. O. W. ruptured.

Diagnosis—Lies between—

1. Escape of liquor amnii;
2. Collection of fluid between amnion and chorion;
3. Hydrorrhea Gravidarum.

In the first, labor follows, while in the second the labor need not follow. The accumulation of fluid between the two membranes seldom occurs till labor. Hydrorrhea Gravidarum cannot be distinguished from abortion with rupture of the fetal sac. Must treat the case as a threatened abortion and wait.

Treatment—Prophylactic. *Endometritis*—Blood tonics, $HgCl_2$ As. During pregnancy rest, but not too much in bed.

III. *Syphilis of the Endometrium*—If the mother be syphilitic the changes are most marked in the decidua serotina; gummatous growths that stretch up between the cotyledons. Also inflammation of the decidua vera, and degeneration of the epithelium of the placenta materna. If the father alone is syphilitic, the changes are limited to the fetal placenta, the villi, q. v.

There is a purulent *endometritis* in pregnancy and also a gonorrheal with secondary infection.

At this point would enter a consideration of abdominal tumors, in their relation to pregnancy, but the time is too short for their consideration.

DISEASES OF THE OVUM.

There are many conditions which affect the child in utero. The acute diseases of the mother influence the child more or less; the fetus has been known to have measles, smallpox, malaria, scarlatina, erysipelas, sepis, typhoid, rheumatism, recurrent fever, yellow fever, pneumonia, etc. The fetus may have endocarditis and pericarditis, inflammation of all of the serous membranes, which may produce hydrocephalus, ascites, etc.; diseases of the nervous system, atrophy, sclerosis, e. g., skin diseases, e. g., ichthyosis, alopecia, elephantiasis, etc.; tumors of all kinds in all the organs, malignant and benign; it may suffer injury from without, may be so cramped by lack of room that it has shortening of muscles, e. g., wry neck. Spontaneous fractures are said to occur, from brittleness of the bones, without any of the usual causes, as syphilitic osteochondritis, rachitis. Luxations occur, which must be distinguished from those due to trauma during labor. Intra-uterine amputations are observed, due to amniotic bands, "Simonart's bands," to spontaneous gangrene (rare), to fracture, circular cellulitis (dubious). The amputated part may float free in the liquor amnii, or be attached by a slender filament, or, if the process occurred early, may be absorbed.

The child is affected by the blood state of the mother. The writer delivered a premature infant, of a mother the subject of chronic anemia. The infant had a large spleen and hemorrhagic diathesis.

Ballantyne tries to treat the child through the mother for disease, e. g., hemophilia. Syphilis is thus treated.

Fever has a bad effect on the fetus. Runge made experiments in this line and found that if the temperature of the mother is raised slowly, the fetus could stand up to 105, but if it were quickly raised, the fetus died and often the mother. The danger, clinically, is slight because sudden rises are unusual. The child tolerates prolonged high temperature well, as was shown in a case of the author's; where a patient had typhoid with much fever for two months without effect on the fetus.

The influence of jaundice is variable. Most often the fetus is not colored. If the icterus be of the grave variety, almost always the infants are still-born or die shortly after birth.

Toxemic mothers, especially if eclamptic, are likely to lose their children. Of eclamptic cases 50% of the children are lost, either during or shortly after birth. Causes, toxemia, interference with placental circulation by stagnation of the blood current, the general hypercarbonization and de-oxydation of the blood, dislocation of the placenta, and lastly the drugs given the mother to cure the disease, or a combination of these causes.

The death of the mother of course influences the child, and the length of time elapsing, as well as the disease from which the mother suffered are the determining factors. If the mother died of toxemia, or eclampsia, heart disease, or anemia, the fetus usually has died first, but if she is dead of an accident, the fetus may live a considerable number of minutes. From five minutes to two hours is the time given by various authors.

Impressions on the mother's mind have been accorded strong influence in producing organic changes in the fetus and peculiarities of temperament. There are those who say that such influences are impossible, basing reasons on—

1. No one ever proved nerves to exist in the umbilical cord.
2. The same deformities exist in the lower animals.
3. The time at which the causative shock took place is usually at a period of fetal development when the body is completely formed.
4. Nearly every pregnant woman has nervous shocks and fears, and the number of deformities is small.

On the other hand examples occur of severe nervous shock during pregnancy followed by such physical and mental deformities that something more than a mere coincidence must be assumed.

TERATOLOGY.

Congenital deformities are not rare. If the deformity is marked the fetus often dies early. Careful inspection of aborted ova shows many not even capable of intra-uterine existence. If the deformity

is marked, interfering with the general development of the infant, it is called a monster.

Of monsters there are single and double.

Of the single monsters we distinguish three kinds—

1. Monstra per defectum—where whole or part of an organ is missing;
2. Monstra per fabricum alienam—where the organ is wrongly developed or out of place;
3. Monstra per excessum—where an organ is enlarged or duplicated.

Theoretically, monsters are produced—

1. Because there is a primary heredity, through the ovum or through the spermatozoid, called impetus of growth;
2. From a primary pathological variation of the germinating ovum;
3. Through the influence of exterior agencies.

The first two are called internal, the third external, causes. The internal causes are usually productive of typical deformities. The mechanism is explained by the assumption of a primary variation in the mode of growth of the ovum, the result of an imperfect ovum or an imperfect spermatozoid or imperfect fusion.

Heredity plays an important part, as we see the same deformity appear in father and child or mother and child. Sometimes a generation is skipped and the deformity reappears in the third; this is called atavism.

External Causes—These are much more frequent and easier understood. Pressure on the fetus, e. g., oligohydramnion, may cause deformity because the child cannot move the extremities, club foot and hand are evidences of this. Shock to the ovum, disturbance of its circulation, through hemorrhages in the decidua, infectious diseases, endometritis, may all cause abortion. Especially do pathological conditions of the amnion cause single monsters. Adhesion of the young embryo to the amnion, inflammation of the amnion and later adhesion, insufficient development of the head, or of the tail fold of the amnion (hinders the development of the head or of the breech and the extremities), and finally abnormalities of the amnion are usually coincident with the absence of closure of the thorax and abdomen, though the former is not necessarily causative of the latter.

The earlier the action of the noxious influence the greater the deformity. Most of the real deformities are fully developed before the end of the third month.

Monstra Per Defectum—If the deformity is great the fetus dies early, abortion occurs, or a mole forms. This mole may be bloody

or fleshy, all traces of the fetus may have vanished, it being absorbed. Or, after the fetus dies, the membranes, the chorion especially, continues to grow and becomes a hydatidiform mole. If later in the existence of the embryo, it mummifies or calcifies. If the cause is a general one, affecting the fetus in all parts, a dwarf is the result. One of the most common of this class of deformities is the absence of closure of the medullary canal, which may be due to primary agenesis, or aplasia of the medullary canal, to early hydrocephalus, or hydrorachis, or to adhesion of the delicate, new-formed medullary canal to the amnion. The deformities resulting from this are grouped under the name Cranio-rachischisis. The splitting may be partial, either involving only the cerebral vertebrae, when we have cranio-schisis, or only the spine, rachischisis. If all of the structures covering the medullary canal are missing, the back presents a smooth, shining groove with or without traces of brain, or spinal cord. If only the bony arch is missing, we have a meningocele, or hernia cerebri, or hernia spinalis, spina-bifida.

When there is a mass of brain more or less large, we call the condition *Acrania;* when all the brain is missing, *Anencephalus.* If the cranium is closed but smaller than normal, it is called microcephalus.

If the anterior cerebral vesicle does not divide, we have a cyclops developed, or a cyclocephalus.

Irregularities in the closing of the branchial clefts produce deformities about the face and neck, the simplest of which are hare lip, and the severest may show absence of large parts of the face.

The anomalies resulting from deficiency of closure of the lateral plates of the body walls, are, hernia umbilicalis, hernia abdominalis, ectopia vesicae, ectopia cordis, etc. These are grouped under the name *Thoracogastroschisis.*

The splitting may go so far as to involve the intestine, showing that the two layers of the colon failed to fuse. Absence of fusion of the lateral halves of the genital and urinary organs produces deformities here, of utmost variety. Hypospadia is the mildest and most common, ectopia vesicae with split pelvis more marked deformity.

Agenesis of the extremities, fusion of the extremities, or of fingers and toes, and deformities due to amniotic bands, occur, but are rare.

II. *Monstra Per Fabricum Alienam*—Are mainly cases of situs inversus viscerum, abnormal position of the kidneys, testicle, colon, and sometimes of the joints, congenital luxations and deformities. These latter are not seldom in the first class.

III. *Monstra Per Excessum*—Increase in the number of a part or organ, an increase in the size of same.

Double Monsters—Double monsters come from one ovum, and are developed from one germinal vesicle. Two germinal spots may be formed, or two primitive streaks, or two medullary grooves, or later on a duplication of one or other end of the germinating zone takes place.

If two embryonal spots appear, it is possible that either two complete individuals (homologous twins), or united twins, result, the two fusing as they grow.

Cause—The cause of these monsters is unknown. Entrance of more than one spermatozoid not the cause; eggs so impregnated die. Whether there is splitting of one primitive streak, or fusion of the two, likewise uncertain. Much room for study here. The double monsters are classified thus:

Terata katadidyma, where the splitting is from above downword.

Thus—

Terata anadidyma, where it is from below—Thus:

Terata anakatadidyma where it is both above and below—thus:

Homologous twins are the best examples of the last class. The growth of the two streaks has been undisturbed; should the splitting be less complete, or should slight fusion have occurred, a double monster would result, of which last class the Siamese twins are a famous example. The specimens are named by the parts (which are usually homologous) that are adherent, e. g., *Thoracopagus. Xiphopagus* (Siamese twins), *Sternopagus, Kraniopagus.* These monsters are equal in development. Those that are unequal in size, etc., are, fetus papyraceous, the acardiaci, the cases of inclusio fetalis, etc.

The terata katadidyma are the Diprosopus, the Dicephalus, the Ischiopagus, the Pygopagus.

The terata anadidyma are the Dipygus, Janiceps. See Ahlfeld's Plates.

The Clinical Aspects of Monsters—Hohl, in 1850, found 55% of single monsters with defects of growth, (m. per defectum), had to be treated by operation, while only 38% of the monsters per excessum, double monsters, or those with parasites, had to be operative. But when the latter came to operation, it was more severe and dangerous by far. In the former only version or extraction usually was necessary, while in the latter all the dangerous obstetrical procedures has to be enlisted.

The single monsters causing dystocia are the hydrocephali, anencephalia, herniae and dilatation of the body cavities with fluid.

Diagnosis—The diagnosis of single monsters can often be made early in labor, and sometimes even before labor, and there are various conditions which may cause us to suspect or anticipate a

monster, e. g., previous labor, hydramnion, and, if a part of the fetus extruded presents a deformity, e. g., club foot, hare lip, spina bifida.

The diagnosis of double monsters is very difficult, at all times, and impossible before labor. Though guesses have been ventured. At most one will diagnose twins, and when there is a stop in the progress of labor the whole hand will be inserted and the union of the two bodies discovered.

Lyell mentions that when a head is born with hare-lip, and labor stops, a double monster may be suspected. Once, in a dicephalus, occlusio ani was observed. If in a case of twins two bags of waters were found, a double monster is excluded. In general, it may be said that the diagnosis of single and double monsters is made so seldom because physicians are usually so careless in their examinations of pregnant women and during labor.

For clinical purposes the various double monsters may be divided as follows, into three forms:

I. Those which offer obstacle to delivery by the increase of the size of the body at one or the other end, e. g., Diprosopus, Cephalothoracopagus, Dipygus Parasiticus, e. g., epignathus, dipygus parasiticus. Most of the monsters belong to the classes, terata ana and terata katadidyma.

II. Those monsters where the fusion is one or the other end, the two having the tendency to form a straight trunk, ischiopagus, pygopagus, craniopagus.

III. Where the monsters are well formed and have freedom of motion at the point of fusion, e. g., thoracopagus, xiphopagus, or where there are two or three heads, well developed on one trunk.

Treatment—In general, breech presentations are more favorable for all monsters, and if double, best if all four legs present. The exception is the ischiopagus, but here usually there is no difficulty. If a hydrocephalus, puncture with trocar, never forceps; in other single monsters, if an indication arises to terminate labor, version followed by extraction, wherever possible. The writer holds that whenever a monster is positively diagnosed, no consideration should be shown the child or children. If the labor can be completed without added dangers to the mother, and the children delivered whole, this course is decidedly preferable, but there must positively be no added danger. As a general rule, it is not a good plan to amputate a part that is already delivered. Although it may give a little more easy access to the genitals, this is not always needed, and, on the other hand, the removal of parts interferes with the mechanism of labor and destroys the relations of one to the other, so that complications are usually added. This is certainly true of the removal of extremities. It is also true in the treatment of interlocked twins.

I. The monsters due to fission at either end. If the head does not engage, version and extraction. If impossible to deliver, perforation and cranioclasis. If the fusion is from below, extraction on all the legs that there are. Seldom possible to extract on part of the number. In doing a version with this class of monsters bring down all the legs. Seldom necessary to amputate parts to deliver breech.

II. The end to end monsters almost never give trouble. One case on record where they bent double like the letter U. Other times they slip out easily.

III. Of the last class, the Siamese twins give a good example. If in such cases the feet present, or can be brought down, the ex traction should thus be done. Deliver the posterior child first, then the anterior. If the heads present, version of both; if this is impossible, bring head of one down and deliver, then turn second, bringing it out by breech. If this is impossible, deliver one, embryotomy, then on the second. If the case is a dicephalus, deliver one head, then try to turn and extract trunk, then, lastly, the second head. If not possible, remove delivered head and then turn balance of monster.

Great care must be given to the kind of monster one has to deal with, as this has much influence on the treatment. The whole hand must be inserted, under anesthetic, and the case then thoroughly worked out before operating.

DISEASES OF THE FETAL ENVELOPES.

The chorion is rarely diseased. It is not seldom thickened. It is sometimes tougher than at other times. Two well-defined pathological conditions affect it. First, more common, a vesicular degeneration; and second, quite rare fibromyxoma.

Vesicular or hydatidiform degeneration of the chorion, or vesicular mole, occurs 1 in about 2,000 cases. It is a hyperplasia and mucoid degeneration of the chorionic villi. The villi enlarge, grow in all directions unequally, multiply and sometimes fill the uterus to the size of a man's head. The villus may thus grow to the size of a pin-head or to that of a hen's egg (rare). Usually they are the size of a pea or bean. The mass looks like a bunch of irregular-sized grapes, and is therefore, called grape mole. Microscopically, the vesicle consists of an inner, lightly cellular mass, full of thin mucoid fluid (altered jelly of Wharton), surrounded by a thin capsule having an inner fibrous layer and an outer cellular layer, said to come from the exochorion. If the fetus is dead there are no blood vessels, but if alive there is a fine capillary network in the degenerated villi. The mass is seldom expelled entirely, but when it is, is covered

more or less completely with decidua. There is more or less decidua between the vesicles, giving the mass greater or less marked consistency. The process may have come to a standstill, hemorrhages have occurred in the mass, and it is more compact, more or less organized. Sometimes all the ovum is changed; this, when the degeneration begins early, before the chorion laeve has atrophied; if later, only the placenta is affected. All the placenta or only a part may be affected. Sometimes a few vesicles will be found on an aborted ovum. One twin ovum may thus be degenerated, the other healthy. The fetus sometimes is completely absorbed, or it may present more or less macerated, or even (rarely) be alive. The degeneration may, if it occurs early, cause the death of the fetus. Also, the death of the fetus may cause the degeneration.

Etiology—Actual exciting cause unknown. Absence of the allantois, absence of vessels in the same, stenosis of the umbilical vein—all have little to convince. The disease may be the result of changes in the fetus and in the mother. That the first is true we may think—

(1) Because one of twins may be affected.

(2) Because aborted ova not seldom show a mild degeneration of the chorion, not enough to kill the fetus, and, therefore, we suspect the death of the fetus caused the former. On the other hand, there must be maternal influence because—

(1) It may occur over and over again (one woman 11 times).

(2) Certain pathological conditions often coexist, endometritis, myomata.

(3) A part of the placenta may degenerate and the fetus normal.

The disease occurs oftener in multiparae than in primiparae; it may occur as late as the 52nd year and as early as the 9th year, usually after the 25th. Syphilis has nothing to do with it. It may occur with general anasarca.

Course of the Disease and Diagnosis—The symptoms will seldom allow a positive diagnosis. Hemorrhage is usually the first symptom, or a bloody serous discharge; very rarely are vesicles found. The blood has less tendency to clot. The uterus grows large rapidly, not corresponding to the time of the pregnancy; it feels different from the normal pregnancy, one cannot feel fetal parts. Sometimes it grows so rapidly that symptoms of distention of the uterus may appear. The uterus does not feel like a healthy pregnancy. Nephritis is not an infrequent complication.

Terminations—

1. Abortion because of the death of the fetus or overdistention of the uterus.

2. Such severe hemorrhage that the physician interferes, or pa-

tient may die from hemorrhage, which may be external or internal (into the peritoneal cavity).

3. Vesicles may burrow into uterine wall, or through it, causing hemorrhage or rupture, or may degenerate into malignant syncitioma.

The condition, therefore, is formidable. The main points in the diagnosis are:

1. The discharge of watery fluid with blood, the rapid and irrelevant enlargement of the uterus with a peculiar consistency.

2. The discharge of vesicles or their palpation per the os.

Prognosis.—Maternal mortality given as 18%, therefore guarded; remember the terminations.

Treatment—Has great effect on the mortality. No time for temporizing after a positive diagnosis is made, but empty the uterus. Otherwise, the usual treatment of abortion. In cleaning out the uterus be careful not to puncture the wall, because it is often thinned in places. Death has thus occurred. Careful to remove everything so that nothing is left to become malignant, or septic, which give added dangers.

Myxoma diffusum. Myxoma fibrosum.

DISEASES OF THE PLACENTA.

Anomalies of size—Normal 500 gms. May be 1,700 gms.; large fetus, usually large placenta. It seems that the chorion may keep up its vascular connection with the mother and grow further. Sometimes a large placenta occurs in hydramnion. Placenta usually 2 cm. thick, but may be thicker. If larger in expanse it is thinner. Sometimes the whole periphery of the ovum is changed into a placenta-like structure, but there is no body like a placenta. This condition exists among the pachydermata, called placenta membranacea.

Form—Sometimes the placenta is divided into several, may be seven, but there is usually one large placenta, and the rest are accessory. Called Placenta Succenturiata, and are connected with the main placenta by blood vessels. If not, they are called Placenta Spuria.

Three views as to the cause of Placenta Succenturiata:

(a) That some of the villi of the chorion laeve develop to form the accessory placenta.

(b) That a portion of the placenta is cut off by white infarcts.

(c) That from some accident the decidua reflexa is missing and the chorionic villi find favorable conditions for growth in the decidua vera.

Clinical Importance—Examine every placenta with this in mind and notice the distribution of the blood vessels.

ANOMALIES OF PLACENTA.

Of the anomalies of the placenta the most frequent is the *White Infarct* (Ackerman). Sometimes called Hepatization, Cirrhosis, Fibrin deposit, Placentitis, etc. Two theories as to their causation:

I. Ackerman's—that there is a fibrous periarteritis, which causes obliteration of the blood vessels and, therefore, infarction. (Williams says endarteritis.)

II. That it is an inflammatory process of the decidua. Truth in both.

I. Explains the numerous small white infarcts on the fetal surface, while II. explains the larger ones on the maternal surface and around the edge of the placenta. Sometimes we see all around the placenta, at a distance variable from the edge, a ring of white fibrous material, called *placenta marginata*. It is due to inflammatory conditions in the decidua; is not rare. These placentae sometimes cause a slight hemorrhage before labor, and may be accompanied by retention of pieces of the chorion (endometritis). Possible that some of the white infarcts may be organized hemorrhages. Fehling has proven that white infarcts occur frequently with nephritis. May be due to the general arterial changes that accompany this disease.

That hemorrhage may occur in such a vascular organ as the placenta is curious, but is a fact. Thrombosis can occur in the maternal sinuses, and increase of the connective tissue, perhaps not inflammatory, can obliterate the villi in greater or less extent.

Clinically—The clinical importance of white infarct is:

(a) Death of the fetus.

(b) Poor nourishment.

(c) Later diseases.

Hemorrhages—Occur during pregnancy, but are slight usually. If early, they may cause abortion; later, they affect the circulation of the fetus to a variable degree, depending on site and extent. May recur, one giving disposition to another, and thus cause a premature separation of the placenta near term. A dangerous complication. Nearly always fatal to child, and in 40% to 55% of cases fatal to the mother.

Hemorrhages sometimes occur at edge of placenta and may be partly organized by the time of labor, and recognized as having caused a partial separation of the organ, but the condition did not grow worse. Sometimes a clot undergoes cystic changes.

A clot may be determined to be old by the stage of organization in which it is found.

Causes—The causes of these hemorrhages are: congestion, acute or chronic; renal disease, stagnation of the uterine blood current,

disease of the villi, of the decidual blood vessels, hemorrhagic diathesis. Acting causes are physical or mental shock, not necessarily severe.

Placentitis—Merely historical interest. There is an inflammation of the decidua serotina, but we have considered that when we considered Endometritis Decidua. Formerly described in three stages, like a Pneumonia, but it does not exist.

Edema—This may occur with hydramnion, interference with the fetal circulation, or with the maternal circulation—heart disease. Liver with dropsy.

The placenta is edematous, thickened, paler, shaggy, because the serotina is separated unevenly.

Villi are club-shaped and swollen. Contour irregular.

Atelectasis—Sometimes a placental cotyledon is completely infiltrated with fibrous material, solid, no intervillous spaces. Dark red in color; hard to the touch. Occurs sometimes in placenta previa, the piece overlapping the internal os has this condition and may make the diagnosis difficult.

This fibrous change may be concrete or may be somewhat diffuse, giving the placenta a fibrous character. It may, therefore, interfere with the nourishment of the fetus.

Calcification—Occurs where white infarcts occur, especially in the upper layers of the decidua serotina. There may be a few calcareous granules, or the whole surface may feel sandy. Occurs especially where the anchoring villi are. They are of no clinical importance. Are composed of calcium and magnesium phosphates and carbonates.

Not syphilitic. Not tuberculous. No indication of the overripeness of the fetus. May occur as early as 6 months. May indicate the last stage of a white infarct. Formerly believed to mean that the pregnancy had lasted over 280 days, but not so. Where they occur in the villi, near the fetal surface, may be pathological.

Syphilis—Syph. placentae are usually not recognized before the 6th month, while the changes of the fetus are marked before this time. Difficult to recognize syphilis on the placenta. Placenta is large, thick, soft, pale, whitish, heavy. Relatively heavier than normal, whether fetus dies in utero or is born at term. If the father is syphilitic, the mother remaining healthy, changes are limited to the chorionic villi. These become swollen, club-shaped; the vessels obliterated by the growth of white cells in and around them. Changes explain the death of the fetus, as the compression exerted by the cells shuts off the blood supply and fetus dies. Also, shuts off the blood of the villi so they get fatty. May be fine hemorrhages.

If the syphilis comes from the mother the changes may be seated in the decidua, i. e., Endometritis Decidua Gummosa.

If the mother becomes syphilitic at the time of the impregnating coitus, we find on the placenta manifestations of syphilis in both zones of growth, the villi and the decidua.

Syphilitic placentae are usually large and feel fatty. They may be adherent to the uterus and sometimes a hemorrhagic condition is caused

Cysts—Not seldom find on the fetal surface cysts beneath the amnion, situated in the chorion, containing a clear or yellowish serum. They may be from a split pea to an orange in size. May be lined with flattened epithelium.

1. Are usually collections of Wharton's Jelly.
2. May be due to hemorrhages in the process of absorption. Have no clinical significance.

Tumors—Tumors of the placenta are very rare. Malignant degeneration of a polyps, the result of placental remnants, has long been known, and that myxomatous moles sometimes become malignant, also. Recently studies have been made which show that sarcomata may develop from the connective tissues of the decidua, stimulated to growth by pregnancy, and cancers of the syncitium covering the villi; decidua-sarcoma, or deciduoma malignum and carcinoma syncitiale.

ANOMALIES OF THE AMNION—POLYHYDRAMNIOS. OLIGOHYDRAMNIOS.

Normal amount of liquor amnii is about 1,000 gms. Varies, however, within very wide limits. Extremes, below 600 gms., is pathological; over 2,000 gms. is pathological—Polyhydramnion. Since we do not know the source of the liquor amnii normally, it is impossible to give a systematic Etiology of the anomalies.

Hydramnion is more common than oligohydramnion, and there may be as much as 6 quarts of water in the uterus. May be fetal or maternal in origin.

I. If fetal we usually find the fetus malformed. Often there is a sort of Amnionitis. (This is not accepted by all authors.) The membrane is discolored and has sometimes formed adhesions to the fetus, e. g., head, organs of the chest or abdomen.

II. In other deformities, find imperfect closures of the fetal clefts, e. g., hare lip, hemicephalus, ectopia vesicae. The hydramnion is due to a transudation from the blood vessels, imperfectly covered. Occlusion of the gullet of the fetus which does not drink the liquor amnii.

III. Diseases of the fetus, involving obstruction to the venous circulation, stasis and edema. Stenosis of the cord, cirrhosis of the liver, stenosis aortae, of the Ductus Botalli. In these cases the

fetal kidneys take on action and get urea in the liquor amnii and a large amount of urine.

IV. Get hydramnion often with twins from one ovum. May be in one or both ova. If marked in one usually less in the other. These cases are due usually to homologous twins, where the circulation of one communicating with the other, one proving stronger than the other forces an extra amount of blood into the blood vessels of the other. As a result of this, there is exudate from the blood vessels of the weaker twin, which may atrophy and become a fetus papyraceous, or an acardiacus, or its heart and kidneys may undergo hypertrophy and cause extra secretion of urine, thus adding to the causes which produce the hydramnion.

V. Jungbluth said that the vasa propria of the chorion persist, therefore hydramnion.

Maternal causes. Relatively seldom causative.

1. All those conditions which cause general anasarca and dropsy, e. g., heart, liver, lung and kidney diseases.

2. Syphilis, leukemia, chronic anemia; but here the exudate occurs in the whole ovum, *hydrops universalis.*

3. Diseases of the placenta, e. g., syphilis.

Hydramnion is more frequent in multiparae than in primiparae, 28 to 5, McClintock.

Clinical Characters—Two kinds—acute and chronic. Only difference being rapidity of development.

The acute is graver and leads usually to abortion.

Begins about the fourth month and rapidly dilates the uterus to colossal size. The mechanical symptoms are greatly increased. Pain in the abdomen, feeling of great tension, dyspnea, especially in primiparae, and attacks of suffocation. Vomiting or nausea marked. Patient emaciates and may have fever. Uterus may be larger than at term. Great edema of lower extremities. Symptoms referable to the kidney of pregnancy or even an acute nephritis.

Findings—Abdomen enormously distended. Uterus tense, no fetal parts palpable. Belly sometimes too tight and painful to get fluctuation. Heart tones may be inaudible. Uterus high (vaginally), so that the vagina is put on the stretch upward.

Diagnosis—If you have known the case before, it is simple. If called, as often happens, because the woman says there is a tumor in the belly which grows very rapidly, the diagnosis may be very hard, from rapidly growing ovarian tumor, especially when complicated with torsion of the pedicle. The persistent absence of heart tones, the demonstration of intermittent uterine contractions, the findings per vaginam, and finally the crucial test, the uterine sound. Use it, since if ovarian tumor, will do no harm. If hydramnion, it

was the treatment, anyway. Diagnosis from twins may be hard, but remember that it is often complicated with twins.

Course—Acute hydramnion usually leads to abortion or the symptoms get so marked that you must induce it. The fetuses die usually, but rarely the symptoms may subside, one fetus dying, the other being born at term. Not to be waited for, however, nor should one wait till fetus viable. Indications are danger to mother from obstruction to respiration, and from uremic symptoms.

Treatment—Abortion—Puncture bag of waters, but let water off very slowly, to avoid shock. Leave the case to nature in the absence of further symptoms.

Chronic Hydramnion—Differs from the acute in that it is much more common; does not lead so often to abortion (sometimes to premature labor); is less rapid in its course. Chronic hydramnion occurs oftener in multiparae, and girls seem to be found more often than boys. Chronic hydramnion is also found in extra uterine pregnancy, which makes the diagnosis exceedingly difficult.

Symptoms—The same, but less marked. Still, the edema may be great and kidney symptoms develop often towards the latter part of pregnancy.

Diagnosis—Lies between this and twin pregnancy, most often, and can usually be made. Remarkable fact that although the uterus is tense, the bag of waters felt through the os is relaxed. Said that in twin pregnancy the bag of waters is tense. Perhaps this may help in the differentiation.

Prognosis—Depends on the cause of the disease. If maternal, e. g., syphilis, heart or kidney lesion, prognosis is not good. But if fetal, prognosis for mother good. Still, must remember that it can cause kidney lesions—and in labor the pains are weak, operative procedures sometimes needed, and tendency to atony uteri post partum, and, therefore, post partum hemorrhage. Prolapse of the cord.

Prognosis—For fetus, in acute hydramnion, is bad. In chronic fair, but remember the frequent occurrence of deformities which may make extra uterine existence impossible.

Treatment—Expectant; watch the kidneys carefully. If respiratory or renal symptoms dangerous, induce premature labor, puncture bag of waters. During labor, if pains weak, puncture bag of waters, but let water off slowly to prevent prolapse of the cord or extremities. Crede, in third stage. Tampon if necessary.

Oligo Hydramnion—This is a decrease in the amount of liquor amnii and is very rare. The decrease may be primary, affecting the ovum early, and resulting in more or less adhesion of the amnion to the fetus. This causes deformities, e. g., hemicephalus, craniorachitis, spina bifida, amputations of extremities, club foot, etc.

If secondary, the decrease comes on later, and then the fetus shrinks up, skin is dry, no panniculus adiposus. At the labor a few tablespoonfuls of thick, yellow-green liquor amnii.

Nothing is definitely known about the etiology.

Clinically of no importance. Very rarely causes dystocia.

ANOMALIES OF THE CORD.

False Knots—The vein is longer than the arteries, and both are longer than the cord, therefore vessels must be twisted and the vein is twisted more than the arteries. Where a vessel forms a loop the jelly of Wharton is sometimes thicker. This makes a marked lump on the cord, and is called a "false knot." Have no practical importance.

Short Cord (Abnormally)—Cases where the fetus is applied to the placenta, and there is no cord at all, are very rare. They usually are complicated with an umbilical hernia. From this the cord varies up to the length of six feet. The causes of this anomaly are not known.

Clinically—Cords are either absolutely too short, or relatively e. g., when there are several turns around the neck or extremities. If too short, they may cause delay in labor. If the pains are strong, the child may be extruded, and the cord tear off the baby, or off the placenta, or tear the placenta from the uterus. In either case, there is danger of asphyxia. In the last case, danger to the mother from intrauterine hemorrhage.

Diagnosis—Treatment—

Forceps is sometimes necessary when there is delay in the labor; in general, too short cords are rare, and usually terminate safely.

Abnormally long cords are not common. The average is 60 cm. (about 24 inches), but there are some reports of cords of 60 inches, and even 10 feet. Aside from the danger of prolapse and coiling around the fetus, they do not possess any clinical importance. Even very short cords can prolapse and often long ones do not, even if given proper conditions.

Coiling—Coiling of the cord around the parts of the fetus has slight significance. If around the neck, sometimes the coils may be so tight as to impede the return circulation from the head. Said that atrophy or hydrocephalus is the result.

The frequency of coils around the neck at labor is 1 to 4. Explained thus: There is a coil of cord at the bottom of the uterine sac and the head, in advancing, goes through the loop. Further, the active fetal movements cause coils. If the coil gets around the neck early in pregnancy, it may kill the child—then abortion.

The cord does not cause amputations of the extremities in utero, because sufficient pressure to do this would cut off the circulation in the cord and kill the fetus first. Sometimes the coiling of the cord around the neck may be diagnosed by the fetal souffle.

Torsion of the Cord—Quite frequent. As a cause of death, very seldom. The torsion may affect the whole cord. As many as 380 turns have been counted. They may even twist the skin of the fetus. They are due to the movements of the fetus. Or the torsion may be in one place. In either case, the vessels are occluded or compressed, and the death of the fetus may be the result. Called *stricture of the cord.* Of course, the torsion may occur after the fetus is dead, and it is probable that a large number of the cases are due to this. Especially likely in macerated fetuses. *Differential Diagnosis*—Between twisting that occurred ante-mortem and post-mortem is made first by noting adhesions between the coils. Second, by trying to untwist them. In twisting occurring before death, the coils are fixed.

True Knots—Not common. May be single or complicated. Rarely cause the death of the fetus. Due to the active movements of the fetus, which slips through a loop of cord. May occur during labor, which is more common. Have little obstetric importance.

Syphilis—Syphilis of the cord is sometimes observed. Commoner than is usually thought, because it is not looked for. Some form of endarteritis, and especially calcareous degeneration, which extends into the media in severe cases. May occlude vessel. Occasionally there are white infiltrated areas in Wharton's jelly which resemble gummata.

Hernia—Hernia into the cord is a rare anomaly. It may be small at birth, and grow because of the crying of the child. Or it may be complicated, with insufficient closure of the abdominal plates. The hernia varies in size from a minimum to the size of a child's head. It is covered by, first, a thin layer of amnion; second, a more or less thick layer of Wharton's jelly; third, peritoneum. If at all extensive the hernia may contain liver and kidneys beside the intestine. If much tension is put on the mysentery, it changes the kyphosis of the spinal column to lordosis and may cause trouble in labor.

Baby dies if operation is not done. Still, in rare cases, the dead amnion is cast off by a layer of granulations, and the part heals over. Otherwise, the fetus dies of peritonitis. Operation should be done on all these cases and as early as possible. Return the contents of the abdomen after dissecting off all the amnion and Wharton's Jelly. Freshen edges and bring together. Only successful in mild cases.

Velamentous Insertion of the Cord—Is the insertion of the cord into the membranes more or less far from the edge of the placenta.

It occurs once in 100 placentae. Due to abnormal adhesion of the allantois, which prevents the rotation of the embryo, which brings the belly opposite the placental site. If the blood vessels run across the os to the placenta, or alongside it, they are liable to rupture and compression during labor, which may cause death or severe asphyxia or anemia to the fetus.

ABORTION.

Most important subject. Said that almost half of the child-bearing women have had a miscarriage before the 35th year. Hegar said that there is one abortion to eight labors; other authors say one to five. Large number of abortions occur in private practice which are not recorded. Large number where even the patient knows nothing about it, occurring in the early months.

Abortion is defined as the interruption and termination of pregnancy before the fetus is viable. Premature labor,—same after viability but before term. Miscarriage—term of the laity, signifying both. Generally considered that a fetus becomes viable after the 28th week, i. e., the 7th lunar month. Rare cases (French) of six months. Sometimes see signs of life in an ovum of five months, but it always dies soon. Best time for induction of premature labor is between 32nd and 35th week.

Time of Occurrence—The first three months of pregnancy show the greatest number, 2nd and 3rd the largest of the three.

Reasons—

1. Ovum not strongly attached, therefore hemorrhage can easily dislodge it.
2. Ovum weak, therefore susceptible to bad influences.
3. At the time of change of the omphalo-mesenteric to the placental circulation, owing to a poor development of the chorion, death of the fetus may occur.
4. Woman does not know of her pregnancy, therefore takes no care of herself.
5. Women that want to produce abortion do it now, because they think it no crime before quickening, and that it is without danger in the first months.

After the third month abortions are less frequent, because the ovum has firmer attachments, the uterus has become accustomed to its burden, etc.

Causes—A study of the etiology of abortion has very great importance, 1st, because of science; 2nd, treatment; 3rd, for the prevention of further abortions; 4th, medico-legal. Therefore, in all cases, search carefully into the causes that produce it. More frequent in multiparae, because endometritis and displacements more

common in them. More frequent in the cities than in the country—certainly criminal abortion is. More frequent in the lower classes than the upper, because of the hard life the former have, lack of care. Criminal abortion, on the other hand, I believe to be more frequent in the upper classes. Causes may be divided into fetal and maternal. Purely arbitrary, because the fetus comes from the mother.

Fetal—Every anomaly of the fetal body or its appendages that may contribute to its death or diminish its vitality may cause abortion; as—

1. Changes in the decidua, chronic decidual endometritis. May have defects in the decidual cells, or pathogenic friability of the blood vessels with resulting apoplexies. If these occur early, the fetus dies from starvation, but if later, the fetus dies of asphyxia. In other forms of endometritis, i. e., hydrorrhea gravidarum, the fetus dies from starvation, but if later, the fetus dies of asphyxia Fluid may set up uterine contractions. If the discharge is continuous the prognosis is better. Endometritis is also a maternal cause.

2. *Diseases of the Chorion*—Hydatidiform degeneration of the chorion very frequently leads to abortion, especially if the placenta be involved; usually attended with furious hemorrhage.

3. *Affections of the Cord*—Torsion, knots, stenosis at some point, usually near the placenta.

4. *Causes of death in the fetal body itself, as*—
   a. When the circulation changes from the omphalo-mesenteric to the placental.
   b. Anomalies of growth, single and double monsters. Rather common in abortion.
   c. Fetus dies from insolation. Sudden high temperature of the mother kills fetus. Runge proved that fetus stands high temperature if slowly increased and intermits, but not if sudden and continuous.
   d. Fetus may be infected from the mother with the disease from which she is suffering, i. e., typhoid, recurrent fever, measles, scarlet fever, malaria. Syphilis manifests itself generally later in pregnancy and kills the fetus in two ways: First, by the syphilitic infiltration of the placenta, mechanically occluding the villi; therefore, death from inanition and asphyxia. Second, the syphilitic changes in the fetus may kill it outright. Seldom before the 5th month.
   e. Nephritis of the mother, either from the toxemia, or the urea poisons the fetus, or the fibro-arteritis at the placental site causes hemorrhages which cut off the circulation.

f. Fetus may die of asphyxia when the blood pressure of the mother is lowered too much, e. g., from extensive hemorrhage. Blood at placental site is quite stagnant, uterine contractions sometimes force it along.

5. *Placenta Previa*—External injury, hemorrhage.

6. All causes that cause hemorrhage in the decidua serotina, e. g., trauma, coitus, heart and lung diseases, alcoholism.

We can easily see how these conditions cause the death of the fetus, but how does the death of the fetus interrupt pregnancy? (1) It is thought that after the death of the fetus the ovum becomes a foreign body and the uterus tries to expel it. Not true in all cases, because the vascular connections are sometimes kept up and the chorion nourished, so that it continues to grow. If these connections are broken, e. g., by a blood clot, this point holds true. (2) When the fetus dies, the stimulation which its growth exerts on the endometrium falls away. Said that the growing ovum inhibits the uterine contractions. In other words, the alteration of the endometrial reflex produced by the death of the fetus is the cause of the expulsion of the ovum. Holds true in cases where the vascular connections are kept up. The time elapsing from the death of the fetus till expulsion varies. Usually inside of a few days, but it may be hours, weeks, even nine months. Seldom over two months. Pieces of the placenta may remain in the uterus for eleven months.

Maternal Causes—We have already spoken of those maternal causes which act by killing the child. The causes to be named will, to a certain extent, be a repetition of these:

1st. Chronic endometritis most potent cause of abortion, especially of habitual abortion, i. e., abortion occurring with each pregnancy. Acts by (a) predisposing to hemorrhage in the decidua, which may cause abortion either by killing the fetus or starting uterine contractions; (b) the endometrium is sensitive and cannot stand irritation of the growing ovum.

2nd. Displacements of the uterus—retroversion and retroflexion. Cannot expand enough, but here an endometritis is started by the chronic venous congestion caused by the displacement.

3rd. Laceration of the cervix. Formerly much considered as the cause. True multiparae have more abortions, and they have lacerated cervix. Usually the concomitant endometritis causes abortion —the symptoms ascribed to laceration being generally due to endometritis.

4th. Metritis. Uterus cannot develop as it should, and then the "irritable uterus" of older writers.

5th. Malformations of the uterus, double and single horned uteri, but not necessarily.

6th. Hydrorrhea gravidarum (endometritis decidua glandularis). Sudden evacuation of the uterus excites contractions.

7th. Trauma, or violence. Usually an important role ascribed to accident, but the patient must possess the predisposition or it will require a severe injury to bring on the pains. In some women no amount of violence is sufficient. Case broken sacrum, no abortion. Another case, where a slight jar to body sufficed. Women almost always try to find some cause under this head. Abortion in primiparae often due to too much coitus.

Of interest is the effect of operations: Usually not the operation but the shock and sepsis that follow that cause the abortion. Operations vary greatly. Ovariotomy has been done frequently with good results. Pregnancy generally is not interrupted if there are no complications. Formerly thought the ovaries exert an influence on pregnancy, and each menstrual period offers a tendency to abort. This is doubtful. Latterly said that corpus luteum has influence in preserving the pregnancy. Doubtful. That the ovaries are not necessary for labor the cases after removal of these organs show. Operations on the labia and cervix have been done without disturbing the pregnancy, also extirpations of breast. Then, again, a slight operation on some distant organ or extremity will bring on an abortion. In judging whether or not a given injury is the cause of abortion there are two criteria to guide us. (1) Must occur immediately after the trauma. (2) The ovum must be fresh and show no other cause for its expulsion. Remember this in medicolegal cases. Never swear that this or that causes the abortion; say that it is in the highest degree probable, etc.

8th. Sudden rise in the temperature of the mother—starts up uterine contractions. Acute infectious diseases, etc.

9th. Syphilis is a frequent cause for abortion and acts by killing the fetus, either directly by affecting the child, or by changes in the placenta, or it may act by lowering the mother's vitality. The same may be said of tuberculosis.

Habitual Abortion—Some women miscarry regularly in each pregnancy. Causes are:

1. *Syphilis,* generally in the later months, seldom before the fifth month. History of such cases is that each abortion occurs later than the last until finally a living child is born, which either presents the signs of syphilis at birth or develops them soon and dies. Later a viable child is born. This shows a gradual weakening of the virus. If at any time the parents are properly treated, the end of the chain described is reached sooner and more abruptly.

2. *Chronic endometritis,* and each abortion intensifies the endometritis.

3. *Habit.* Seems that the habit once formed is kept. If a woman induces abortion in first pregnancy, she is liable to abort later.

4. Nephritis.

Mechanism of Abortion—There are three factors involved in abortion: Decidua, Placenta and Fetus. In the first six weeks the decidua is the important factor. The ovum is small, soft, compressible, very easily detached and slips out unobserved. The separation of the decidua is the important part and often is completed with difficulty by nature. From the 6th or 8th week to 5th month the placenta plays the important role. The fetus is small, but the placenta is relatively large, often separates with difficulty, and gives rise to severe hemorrhage. From now until term the fetus is most important. The separation of the ovum takes place in the cellular layer of the decidua as at term. Separation begins at the cervix and goes to the fundus—is especially hard in the tubal corners, therefore pieces likely to adhere at these points.

First Period—In the first six weeks the whole ovum is usually born. The decidua covers it, and sometimes possible to distinguish vera and reflexa. Or the ovum just covered by the reflexa is born or the reflexa breaks, the ovum covered with the shaggy coat of villi, is born naked. In the latter cases the decidua has to be thrown out by another effort of the uterus, which is usually accompanied by hemorrhage, or the deciduae come away with the lochia, piece-meal. Whenever you see an ovum expelled with a shaggy coat, you may know the deciduae are still in the uterus.

In the Second Period—i. e., from the 6th or 8th week to 5th month—the process may take two courses: 1st. The whole ovum, fetus in the sac, and placenta, expelled. This may be called the typical or normal course and offers the best prognosis for mother. 2nd. The membranes rupture, the fetus is expelled, the cervix closes, and the uterus has to exert a new effort to expel the secundines. The hemorrhage is usually profuse; this may be called the atypical or abnormal course, and offers worse prognosis because of hemorrhage, sepsis, operation. The uterine contractions force the ovum down into the cervix. This is softened and dilated from above downwards as in labor. Separation of the ovum from the uterine wall and extrusion take place at the same time. In multiparae, as soon as the internal os is passed, the ovum slips into the vagina. In primiparae, the external os offers resistance and this may be enough to prevent the further exit of the ovum. If it be small, the cervix dilates and contains it, while the internal os closes behind it. Called cervical pregnancy by Rokitansky, but better name is cervical abortion. Sometimes the ovum is too firmly adherent at some point, usually the corner of the uterus, and hangs down. This is usually the case when the membranes break. The uterus, if given time, will

usually separate the ovum and expel it, but it may be accompanied by such hemorrhage as to become dangerous, or the process may take so long that sepsis sets in. The hemorrhage comes from the vessels in the decidua or from the placental site.

The course of abortion may be quite protracted; generally takes a day, but it may last hours, days or weeks. When the fetus is expelled and part or all of the secundines are left, we speak of incomplete abortion.

Third Period—Abortion in the 5th month, and later, is really a labor in miniature and needs no further description.

Symptoms—There are four chief symptoms in abortion:

1. Uterine hemorrhage. 2. Uterine pain. 3. Softening and dilatation of cervix. 4. Presentation or expulsion of all or part of ovum.

We divide the course of abortion into three stages:

A. Threatened abortion.
B. Abortion in progress.
C. Incomplete abortion.

In threatened abortion the main symptom is hemorrhage, which may come with a gush or more usually by a slight oozing of blood or bloody slime, may be of brown color. This may keep up for several weeks, or stop and recommence after weeks. Light, drawing pains are usually felt, or sometimes labor pains, but they are not so severe as at term. Sometimes pain is a very slight symptom, only a weight in the pelvis. Softening and dilation of the cervix slight indeed. Uterus is harder than it ought to be, because it is contracting. After a shorter or longer period, which may be hours, days or weeks, symptoms subside and pregnancy goes on to term, or suddenly the hemorrhage becomes profuse and abortion occurs, or interference is necessary.

Abortion in progress presents the same symptoms intensified. Hemorrhage more, pain greater, and resembles more the labor pains. The cervix begins to soften and dilate from above downward and the examining finger feels the ovum in the cervix or uterus. Pain varies greatly, perhaps a few slight pains, and the whole ovum is extruded, or may have real hard pains for hours. Hemorrhage varies also, sometimes abortion occurs spontaneously and there is very little hemorrhage, again the woman may almost bleed to death (very rare), with all grades between. The symptoms of abortion vary, of course, with the course of the abortion.

1. If the whole ovum and decidua are expelled at once, the hemorrhage and pain cease and the patient recovers.

2. If the membranes break, the fetus escaping, after a longer or shorter period, minutes or hours, the remainder is expelled or

removed by the physician. This means another period of hemorrhage and pains.

Incomplete abortions means the retention of all or part of the secundines. In general, there are four terminations of incomplete abortion:

1. The cervix closes to a great extent and what is left gradually breaks up and is discharged in the lochia. In these cases the lochia are profuse and keep up until the last bit is discharged. Chronic endometritis likely to follow.

2. A complete interval of rest may occur, when the uterus suddenly discharges its contents. This may be days or months.

3. Decomposition sets in and the pieces are exfoliated, or the patient dies of sepsis (rare).

4. Placental polyp is formed. What is left is nourished and becomes a placental polyp, or is covered by blood deposits. Sarcoma deciduo-cellulare may result.

Diagnosis—Usually the diagnosis of abortion is not difficult, when we know the case to be one of pregnancy, but sometimes necessary to diagnose the pregnancy, and this, when the abortion is in progress, may be hard. Everything depends upon the bimanual. Softening of the vagina, cervix, enlargement of the uterus. Hard and contracting uterus, signs and symptoms of pregnancy, but rely on the objective signs only.

Rule—Treat every case of hemorrhage occurring in a woman capable of reproduction, after an amenorrhoea of one or two months, as an abortion. Seldom far out on the diagnosis. Extra uterine pregnancy must be considered if there is a tumor alongside the uterus.

In threatened abortion, the softening and dilatation of the lower uterine segment are not marked, and we have only the fact of pregnancy and the hemorrhage with pain to guide us. In abortion in progress the cervix allows the finger to feel the ovum, which settles the diagnosis, or can feel the ovum bulging the upper cervix.

In incomplete abortion a polypus may need differentiation—history, etc. Treatment, the same. When a woman has had an abortion and has continued irregular hemorrhages, or bloody slime, has a softened, enlarged cervix, a patulous external and internal os, a large uterus (usually hard), we call it incomplete abortion. The finger in the cervix may feel part of the placenta, or decidua, hanging down, or patient may say that pieces of these parts are observed to pass. The continued hemorrhage may cause severe anemia. Unless attempts have been made to remove these parts, they do not usually become septic.

Of great importance is the diagnosis of the life or death of the fetus. In the early months this cannot be done with certainty. We

think of death of the fetus when a pregnant woman has already born degenerated ova, has had irregular hemorrhage for some time, or bloody mucus, and in which the uterus is hard, round and smaller than at the time of the supposed pregnancy *and does not grow*. In all other cases we suppose the fetus living, but as far as treatment is concerned, treat all cases as if fetus were alive; if dead, it will soon be expelled; if alive, pregnancy may continue to term.

Prognosis—For the child, bad, because the fetal death often the cause of the abortion; the fetus is born at a time when it is not viable. Of course, the nearer the seventh month the better the prognosis.

For the mother: Prognosis as to life is good, very few die. From hemorrhage seldom, because even if she loses much blood, faints, clotting. Still, women do die from hemorrhage, especially if after long continued, frequent hemorrhage another severe hemorrhage. Usually death is from sepsis. Amount of blood which is dangerous to woman varies. When an abortion with sepsis, suspect criminal operation. Symptoms of sepsis with abortion are: Temperature, pulse, pain, discharge fetid, etc. Of the deaths, majority due to sepsis, peritonitis, pyemia. Prognosis as to health, bad. Abortion worse for woman than labor at full term. Involution is slower, lasting two to three months, and if sepsis, almost always some subinvolution. Endometritis often remains behind, due to retention of some part of the decidua, when we find decidual cells, like at labor, for a long time after. Endometritis post abortum or a hypertrophied condition of the endometrium; endometritis interstitialis; rarely endometritis glandularis. Very often some pelvic cellulitis. Not seldom women invalids for life.

Treatment—Treatment of habitual abortion or recurrent abortion. Find the cause and treat the cause—Syphilis, chronic endometritis, retroflexion. Examine the woman. During pregnancy, KI, $KClO_3$, Viburnum, all useless; rest in bed—not all the time, but only during menstrual periods; former cruel and useless. Later, when premature labor threatens, may be tried. If chronic endometritis, keep all accidents away. Alterative tonics in pregnancy.

Treatment of threatened abortion: Only object is to arrest uterine contractions—rest in bed, opium, gr. ¼ morphine every four hours. More if necessary, and can be watched. Light diet, tincture opium, 20 min., per rectum, repeat every two hours. Hemorrhage cases, keep in bed two to four days after all flowing ceased, and should very gradually resume active duties. Go to bed again when the first show appears. If, after a time, examination should show the presence of a dead ovum, let the abortion take place. Abortion is inevitable when there is a history of clots of various sizes being passed; inevitable when hemorrhage is profuse; when uterine con-

tractions continue in spite of treatment. These cases almost always terminate in complete evacuation of the uterus. But sometimes, even if the ovum has reached the cervix and the hemorrhage has been very profuse, the pains and hemorrhage may cease, the cervix close and the pregnancy go to term.

Abortion in Progress—Opinions differ widely as to its treatment. Since there are so many abortions, and if sepsis does not complicate them they get well so uniformly, we can adduce various reasons for this difference of opinion:

1. A large number get well alone.
2. Different abortions require varied methods of treatment, i. e., cannot fit all to one form.
3. Some abortions recover under any form of treatment, i. e., there are several good methods of treatment for a given abortion.

The treatment of abortion is *watchful expectancy*. Same as labor at term. While the treatment is expectancy, expediency may demand an active part of you, e. g., you live a long way off from the patient and cannot stay at bedside. The indications for interference, aside from expediency, are: 1. Hemorrhage. 2. Sepsis. If hemorrhage is profuse, interfere. If the cervix is not yet dilated, tampon the vagina. If the cervix is effaced and admits one finger easily, or two, remove the ovum—pressure, traction, ether and manual removal.

Vaginal Tampon—Is not devoid of danger, because of sepsis, already present in the vagina, or introduced with the tampon; further, the tampon is painful, and usually causes retention of urine—better of two evils, however.

Technique—Sim's speculum, long forceps, douche point, catheter. Patient across bed, or Sim's position, or knee-chest position; scrub with soap and water, clip long hair, hands clean, vaginal douche, scrub parts, cervix cleaned (douche in dorsal position). Have everything at hand. Cotton wrung out of ½% lysol, or plain sterilized cotton, and a small piece weak iodoform gauze. Have enough pledgets. Catheterize. Speculum held by husband or sister or nurse. Pack cervix tightly with the iodoform gauze. Two fingers guide the cotton and pack it around cervix, then against cervix till upper half of vagina full and tight, then lower half not so tight. Big pledget against vulva, T-binder, bed. Take the temperature every four hours, and a rise above 99.6° F. indicates immediate removal of the tampon. Leave the tampon from 6 to 24 hours, according to circumstances, never more than 24 hours, average 12 hours. Remove and often find ovum on tampon or in the cervix. If the cervix not dilated, tampon again. If the ovum is not expelled now, it is because it is pathologically adherent and must be removed by hand. Tampon first excites uterine contractions; second, blood

accumulates on top of the tampon and separates ovum from wall of the uterus. If the cervix is dilated we may tampon or remove the ovum. Great difference of opinion.

As was said, treatment is watchful expectancy, but if hemorrhage is great, must do something. If ovum is in cervix, pressure may remove it complete—two fingers in the anterior fornix, hand over fundus, Hoening's method; or traction on the extruded part, two vaginal fingers exert gentle traction. Take time and may succeed. If unsuccessful, and there is indication to empty the uterus, operation is necessary.

Instruments—Uterine catheter, Bozeman—zinc or a large silver male catheter, glass good but fragile, specula, uterine packing forceps, and tubular packer. Curettes, half sharp, large. Tenaculum forceps, 8-inch forceps, chloroform or ether, assistant. Dorsal position, scrub, clip hair, vaginal douche 1% lysol; in septic cases, uterus also. Hands very carefully prepared, half hand in vagina, one or two fingers in the cervix, into uterus, hand outside forces uterus over finger like a glove and the finger softly separates the adherent portion of the egg. After all is separated, use expression as described. Sometimes very adherent at placental site, hence care to keep whole and separate gradually. After the ovum is removed give a "revision" of the uterus and separate with the finger nail all retained portions. Uterus should be smooth except at the placental site which is a little elevated from the surface and rough. Sometimes, especially in the early weeks, decidua too adherent, or the finger too cramped to work well. Here use the curette, locate piece with the finger and go in and scrape it off. Care because of danger of perforating the uterus, therefore, gently and note how far the curette goes in. Curette the whole surface till it is smooth. Now prolonged irrigation of the uterus with 1% lysol or light tincture of iodine. Optional whether you put iodoform gauze in uterus. If there is hemorrhage or sepsis, the uterus may be packed, in the former tightly, in the latter, loosely, and with weak iodoform gauze. To be removed in four to five hours.

Incomplete Abortion—Means those cases where fetus escaped and all or part of the secundines are retained in utero.

Diagnosis—Not always easy. 1. History, which may fail. 2. Signs of pregnancy. 3. Local examination, (a) soft vaginal walls; (b) softened patulous cervix; may be shreds of membrane; (c) large, flabby uterus; (d) hemorrhage, and if sepsis, pain, fever, fetor to discharge; color, dark brown. Remember ectopic pregnancy.

Treatment—There are two views: 1. Clean out the uterus at once. 2. Tampon uterus and vagina and wait. 3. Wait and operate only under some indication—hemorrhage, sepsis. I prefer the more active course, but let circumstances govern the method of

procedure. If the hemorrhage is profuse or repeated often there is no other course but to clean out the uterus. If the patient has fever, same treatment; if neither present, justifiable to wait. If you live far away, clean out the uterus. Clean out the uterus is the rule, wait the exception. It is easy to do this when os is dilated, or dilatable. Usually easy in multiparae, harder in primiparae. Dilatation of the cervix often an important point. Various methods:

1. Sponge tents, not good, septic. 2. Laminaria, hard to sterilize, slow and not very efficient. 3. Steel divulsors, rapid but dangerous, because of laceration. 4. Best are Hegar's dilators. Can sometimes dilate cervix in 15 minutes. Dangerous, too. 5. The finger, very good dilator.

Procedure is exactly same as described. Fingers to be used in all possible cases and, as experience grows, used almost exclusively. Remember the danger of perforation of uterus. After all abortions give ergot and hydrastis for a week or more, to favor involution.

Treatment of Septic Abortions—Empty the uterus thoroughly as quickly as possible. If the cervix is dilated *remove with the fingers,* and be sure to leave the endometrium smooth. Give a prolonged uterine, 1% lysol, douche before and after removal. Put a piece of iodoform gauze in uterus and remove it after 4 to 5 hours. The treatment is the same whether the whole ovum is in the uterus or only a part. Clean out the uterus. May be hard to deliver the fetus. Try expression, after detaching the ovum. Pull the ovum out by hooking the finger over it. If the fetus is larger, say the 4th or 5th month, turn it and extract by foot, but beware of pulling the body from the head. Aid with a long polypus forceps, or a stone forceps. After this, scrape out the placenta, etc. It may be necessary to dilate the cervix with the finger or Hegar's dilators. If there are symptoms of peritonitis it is a bad case, and extirpation of the uterus may be more surgical a procedure. Hard to decide. Chill and high fever likely to follow intervention.

To sum Up the Treatment of Abortion—

(1) Watchful expectancy as long as the hemorrhage is not great and there is no sepsis.

(2) If hemorrhage is great and cervix not dilated, no temperature, tampon vagina.

(3) If hemorrhage is great and os dilated, remove ovum, expression, traction, manual removal.

(4) If abortion incomplete, remove everything in the uterus, dilating cervix if necessary.

(5) In septic abortions, clean out the uterus antiseptically with fingers, and put in a strip of iodoform gauze for four or five hours.

Schaeffer, of Heidelberg, found that the women that had been

curetted after abortion had better health than those who were not; that there is less of menstrual irregularities, less subsequent abortions and more full term labors and less trouble with the labors, especially with the third stage. Usually the abortion was preceded by some trouble with the endometrium, or the general system, and this is aggravated.

Changes in the Ovum After Death of Fetus—If the fetus dies in the early weeks the chorion and the decidua which are nourished by maternal blood may go on growing. But hemorrhages, apoplexies, are very common in the decidua and one causes another till the whole periphery of the ovum is invaded. The cavity of the amnion is crowded together, or the blood may in rare cases break into the ovum itself. Or the membranes may undergo an eccentric hypertrophy and the cavity grows larger, fills with amniotic fluid, and may be of the size of an ovum of two months. Adhering to one side you find a fetus of three weeks. This is called a "blood mole." When they are older and, to a certain extent, decolorized, they are called "fleshy moles." History of such cases is: they usually cause repeated greater or smaller hemorrhages till finally the uterus expels them, or the attendant interferes.

Later in pregnancy, when the fetus already has some size, varied changes may occur before the ovum is expelled.

1. Most common is *Maceration*. Fetus imbibes blood and is stained. Tissues soft. Bones loose, especially cranial. Skin larger than the body, epidermis falls off in big pieces; red corium exposed. Cord thick and stained with blood. Placenta, which may go on growing, is larger than the size of the fetus would demand, and is pale and soft. Impossible to tell how long a fetus has been dead by the changes, because sometimes little changed after many days, and again, changed much in a few days. Due in part to presence of digestive ferments in liq. amnii.

Runge said the vitreous humor became cloudy on the third day, then the lens from without inward. Called Fetus Sanguinolentus.

2. *Mummification*—Fetus dries up. Very little liquor amnii. Fetus dry, gray, sometimes leathery. Organs dry, sometimes cheesy. Bones and tendons least affected. Occurs oftenest with twins, when one is found pressed against the uterine wall. Fetus Compressus, or thinned out like paper, *fetus papyraceous*. Cause is —one fetus dies, sometime during pregnancy, the other goes to term, while the dead one dries up. Also occurs when the fetus dies from the cord being around the neck, etc.

3. *Lithopaedeon*—A Lithopaedeon may form. Process is the same as in extra uterine pregnancy. Not so frequent as in cows and sheep.

4. *Septic Infection*—Septic infection of the uterine contents oc-

curs, but this is usually due to futile attempts to empty the uterus. May occur of itself.

THE PATHOLOGY OF LABOR.

An obstetric case is a surgical case, with more than usual aspects. Best to regard every labor case as a severe operation, and, like the surgeon, the obstetrician considers first the strength of the patient to stand the shock; second, the asepsis and antisepsis; third, the nature and technique of the operation; and, fourth, the complications likely to arise.

So, during labor, it is necessary and our duty to have a clear knowledge of the patient's conditions, especially heart, lungs, kidneys and blood; second, we must know accurately what is going on during the labor, i. e., knowledge of the mechanism of the particular labor, of the strength of the powers, of the greatness of the resistances and the relation between them; third, we must be aware of all possible complications and the particular ones likely to arise in this particular case, and know how to prevent and treat them; and, finally, we must know and practice the strict principles of asepsis and antisepsis, that the latest standards demand. To meet all these obligations is the duty of the obstetrician, and a conscientious man will find little time for idling at a labor case. It requires studious regard of the patient during her pregnancy, and getting her into the best possible condition for labor. It requires a prompt response to the call to the labor, a careful and painstaking examination on arrival, and a proper valuation of all the conditions found. It requires attentive conduct of the case from beginning to end, and a preparedness for doing the usual work of a confinement case, plus far-reaching provision for all emergencies.

In general, we find the abnormalities of a labor under three heads:

(1) Anomalies of the powers. (2) Disproportion in the powers, and the resistances due to too small passages. (3) Complications, either maternal or fetal.

In the study of these three aspects of a case we often find reasons for interference with the course of nature. We call this an "indication" to interfere. There may be, however, certain requirements in the case which may cause us to modify the indication. We call this a "condition." A condition governs the indication, e. g., a woman in labor develops eclampsia. The indication is to deliver at once, but the cervix is closed. The state of the woman demanding delivery is the indication; the state of the cervix, which governs the indication, is the condition.

When a condition prohibits the course of procedure called for

by the indication, it is called a contra-indication. The determination that a given case requires this or that remedy, or course of conduct, we call "placing the indication," and only when the indication is clear and all the conditions fully met, may we act.

The Powers of Labor—Are, 1st, the uterine contractions; 2nd, the abdominal muscles; 3rd, the contraction of the vagina; 4th, gravity. Of these, the uterine contractions and the abdominal muscles alone are important, and we may have anomalies of either of these.

In the *first* stage of labor the uterus does all the work. Regularly, every five to ten minutes, its muscle contracts, slowly reaching acme, then relaxing. In this way the lower uterine segment is formed, the cervix effaced, the bag of waters formed, the os dilated. As a result of the extension of the fetal body, and the general intrauterine pressure, the fetus advances through the birth-canal.

In the *second stage*, the larger part of the work is done by the abdominal muscles—abdominal pressure. This is proved by the following points: 1st. That the weakly developed woman may not be in position to expel the child. 2nd. Women have refused to exert the abdominal muscles, and the labor stood still. 3rd. The uterus has by this time drawn well up over the child, and can exert but little power. Still, in some cases the uterine power does expel the child, and in all cases it serves the purpose of forcing the child against the perineum, which causes the action of the abdominal muscles reflexly.

We have, in reality, two forms of weakness of the powers; one, of the *uterine power*, another of the *abdominal pressure*. The abdominal pressure is subject to important anomalies, which are not generally recognized, most attention being directed to the irregularities of the uterine action.

The abdominal pressure may be too strong, in that the patient bears down so much as to endanger the soft parts by too rapid exit of the head. If the bearing down efforts are strong before the cervix is dilated, this may be torn and post partum hemorrhage caused. If the patient bears down too much when the head is passing the vulva, the vagina and the perineum may be torn more than is necessary. The baby, too, may be injured by too rapid delivery, e. g., intracranial hemorrhage, or by being hurled against the foot of the bed or to the floor. Women have fractured the sternum in a few instances.

Weakness of the abdominal muscles is more common. It occurs in inflammatory conditions in and about the pelvis, e. g., peritonitis; in cardiac and pulmonary diseases; hernia, umbilical, inguinal or femoral hernia; in some spinal cord affections; during narcosis or coma; and sometimes in weak women or those who are exhausted

by long labor, or who have started to make bearing down efforts too early, in the first stage of labor.

The treatment of too strong abdominal effort is lateral position, warning to the mother, narcotics. The treatment of the weakness of the abdominal pressure varies with the cause. In cases of inflammatory conditions in the abdomen and in cardiac and respiratory affections, the patient should not bear down. Labor must be terminated by forceps. If the patient is tired out, morphine or chloroform may give her a short respite, after which she may work to better advantage. A change in position from the side to the back, or back to the side, may be useful. If the second stage is well advanced, the patient may be given the arm of the husband, or the physician, to pull on, and instructed how best to use her remaining power. She may be allowed to sit up. The use of the obstetric chair is recommended by Ahlfeld. Ritgen's maneuver has been done, pressing out the head with two fingers operating from the rectum. This, in my opinion, is somewhat risky—danger of injury to rectum. Kristeller's expression may be used in selected cases. This consists of pressure by means of the two hands spread evenly over the fundus, downward in the direction of the axis of the inlet. Even pressure, during a pain, slowly increasing, slowly decreasing, not too much force, never when the lower uterine segment is thinned, seldom in multiparae—are the rules for success. It is not without danger—rupture of the uterus, dislocation of the placenta, injury to the abdominal viscera. Hofmeier recommends pressing the head into the pelvis with the hands. If all that is needed is to overcome the resistance of the perineum, an episiotomy may be done. Should those measures fail, the forceps may be used, and 75% of forceps operations in America are done for conditions of this kind.

Anomalies of Uterine Action—These are not common, but there are many varieties of pains. These vary in different women, in different labors, and in the different stages of a labor. Too little study has been given the varieties of labor pains and their clinical significance.

The pains may be too infrequent, i. e., the long intervals common to early in the first stage, may be found in the second stage.

Dangers here are sepsis, and prolonged impaction of head in pelvis. The infrequent pains, too, do not stimulate the abdominal muscles. Labor in such cases may drag on for days. Patient will have pains at long intervals, or have a series at short periods, then a rest of several hours, or may be days. If the condition persists, the temperature rises, and then the pains usually come on, quickly terminating the labor.

The weak pain or inertia uteri is due to many conditions. It

may be actually weak, or relatively so, in regard to the resistance to be overcome.

The actually weak uterine contraction may be due to poor general health, tuberculosis, chronic wasting disease, anemia, or acute diseases, but the pains are often strong in these conditions.

There are local causes for inertia uteri, as too great distension of the uterus, by hydramnion, by twins, or inflammation, by physometra, abnormal position of the uterus (anteversion), tumors. The uterus may be weakened by hemorrhage; it may be anemic from unequal pressure on the fetus in dry labors.

The uterus may be tired from long effort; either the muscle was poorly developed, e. g., infantile uterus, weak women or the labor is lasting too long; the uterus may contract irregularly, forming contraction rings at various points; finally, the uterus may be deformed, uterus bicornus, or septus.

The nervous mechanism of the uterus may be disturbed, a shock will often drive the pains away, or fear of an operation hasten them. The suffering they cause may be sufficient, in hyperesthetic women, to inhibit them, and it may seem paradoxical, but morphine may strengthen weak pains.

Diagnosis—The diagnosis is easy. The uterus does not harden during a pain, the patient complains of little suffering, there is no progress in the labor, and no effect on the fetal heart tones. The relaxed condition of a uterus near the point of rupturing is easy to separate from the condition being described.

Atony of the uterus sometimes occurs in the third stage, leading to hemorrhage, retention of membrane, and pieces of placenta. A paralysis of the placental site exists, the remainder of the uterus contracting well.

Treatment—The treatment of weak pains varies with the cause. A rest obtained by chloral, gr. xv to xxx, is one of the best means. Morphine, gr. ¼, good—with the chloral, perhaps. Stimulating drugs usually not recommended. No quinine or ergot. Strychnine, coffee and a little wine of most service when stimulating drugs are needed.

Locally, a small colpeurynter may be placed in the cervix and drawn upon, or in the vagina. A bougie in the uterus will stimulate pains.

Suggestion to be employed, with moral and mental support. Hot bath, especially the hot sitz bath, and abdominal massage. Electricity may be tried; use the faradic current, but not strong enough to cause pain.

Watchful expectancy to be used, but see that the patient does not suffer too long, because of sepsis and the depressing effect on the nervous system of long labor. Keep up nourishment.

The pains may be too frequent, and at the same time too strong, but they are usually irregular in strength, and do not produce commensurate progress in the labor. They are produced by too frequent and rough examinations, restlessness of the patient and inordinate use of abdominal muscles. The frequency of the pains is dangerous to the fetus by preventing the change of the blood in the uterus (asphyxia), and bad for the mother because the uterus needs a rest between pains and the general system, too. Nervous manifestations may arise. If the pains are too strong and too frequent, there is danger of laceration of the cervix, and the perineum, by the rapid exit of the child; the latter may be hurled into the world and suffer injury, e. g., fracture of skull, the cord sometimes tears from the body, or the placenta, but hemorrhage not usual. Post partum hemorrhage may occur, even inversio uteri. Sometimes syncope.

These are called precipitate labors, and may sometimes occur when the patient is on the water closet, when the infant may be lost. Important from a medico-legal standpoint.

The pains may last too long, over 60 or 90 seconds. Causes same as too strong pains and irritation of the lower uterine segment from maladaptation of the presenting part on the pelvis, e. g., flat pelvis, shoulder presentation, after rupture of the bag of waters. The use of ergot during labor and attempts to hasten things by various manipulations.

Tetanus Uteri—If combined with severe suffering, they are "cramp pains." Labor does not progress, rather is retarded; the fetus is endangered by asphyxia, sepsis is invited, the patient is soon in a highly excited condition, which may approach acute mania, and if not relieved may die of exhaustion.

The pains may be too painful, i. e., the suffering may be incommensurate with the strength of the uterine contraction, and with the progress in labor. This is found in small, nervous, fearful, hyperesthetic women. Often hysterical, and may be simulated. Requires discrimination to diagnose these different conditions.

Treatment—The treatment is on general lines. Narcotics, of which chloral and opium best, by mouth and rectum, in large doses, e. g., 30 gr. chloral per rectum, and gr. ¼ by mouth; repeat in two hours if necessary to procure rest. Give prolonged warm full bath. No manipulations on uterus or per vagina. Chloroform may be given to the obstetrical degree, but sometimes it is better to put the patient to sleep for three-quarers of an hour and when she wakes the pains are more regular.

The uterus may contract irregularly in places; when the contraction ring of Bandl is contracted, a condition spoken of as "hour glass" results. This may imprison the fetus by grasping its body and impose an obstruction to the passage of the trunk. If forceps

are applied, the uterus may be injured. If in the third stage, the constriction occurs, it may lock the placenta in, and give rise to severe hemorrhage. Caused by brusque manipulations on the uterus and use of ergot, and meddlesome attempts to hasten delivery. Irregular contractions are observed during pregnancy.

Treatment—The same as the last condition.

Anomalies in the Passage and Passengers—The second factor in a given labor is the *Resistance*, i. e., the relation of the force exerted by the powers on the fetus against the passages. The study of these things so as to properly estimate the amount of resistance offered by the fetus to the passages, or by the passages to the fetus, the one or the other being abnormal, is an important part of the conduct of every labor.

Abnormal Resistance by the Passages—Obstructions of the soft parts:

(1) Rigidity of the cervix. Of this there are two kinds: (1) Anatomical; (2) Spasmodic. The first is a pathologically changed cervix, the second is due to spasm of the muscle fibres. Causes of the first are: (a) chronic cervical endometritis; (b) scars from cautery or Emmett's operation; (c) syphilis; (d) old ulcerative processes; (e) conglutinatio orificii externi; (f) old primiparae, have often lack of dilatability; (g) carcinoma.

The second form is due to rough and frequent examinations, frequent and strong uterine pains, ergot, highly excited patient, prolonged labor.

In the first class, there is an anatomical basis of the rigidity. A great deal depends on the site, if in the supra-median, or vaginal portion of the cervix. Wherever located the cervix dilates under the influence of the pains up to the obstruction. If the pains are strong enough after a certain period the part dilates. If part does not dilate the child dies and the uterus may rupture, or the cervix may tear across and the child be born through the rent, or the cervix may tear off circularly. Cases of pathological stenosis of the cervix are rare. Slight induration which makes labor longer, but allows a spontaneous termination, are not rare.

Conglutinatio Orificii Externi is a condition where the few circular fibres around the external os refuse to dilate; as a result the cervix is not dilated, but thinned by the head and may be delivered externally still covering the head. The os cannot be found by the finger, but the opening can be seen in the speculum as a tiny hole with a little mucus and surrounded by a very red ring. The finger can overcome the resistance of the external os and then the dilation goes on rapidly.

Treatment of pathological stenosis of the cervix: When, after strong pains have made no impression on the cervix, and something

must be done, there are three methods of enlarging the cervix: (1) the hand; (2) rubber bags; (3) incisions, Hysterostomotomy; (4) Bossi's dilator; (5) vaginal Caesarean section. The hand succeeds in the mildest cases, as do the rubber bags. Tarnier has invented an instrument shaped like a three-leaved speculum with the ends turned off at right angle. This is not often successful and is very painful; it is likely to slip off, or tear and bruise the cervix. Incisions in the cervix are made to either side. An angular scissors with blunt points is used, or a blunt-ended bistuory. The cervix must be protected by two fingers, the incisions may be one inch deep. In the subsequent extraction they usually do not tear further. In certain cases it may be necessary to cut the cervix laterally to the fornices. This, together with the rapid extraction of the fetus, is called Accouchment force, or forced labor, and is sometimes done in cases of eclampsia. Formerly done in placenta previa, but not to be recommended.

Bossi's dilator dangerous and not more efficient than the hand. Vaginal Caesarean section useful in operations from sixth to eighth month of pregnancy. At term quite serious operation.

Spasmodic rigidity of the cervix may be diagnosed in the cases given by recognizing the cause. In these cases also the parts are hot and dry. In the speculum they are red.

Treatment—Leave the patient as much as possible alone. Give a hot bath or a sitz bath prolonged for 20 minutes. Put an ice cap on the head or a cold wet cloth around the neck to prevent congestion of the head; chloral and morphine. The best remedy is chloroform to the obstetric degree. In these cases it hastens labor, or the patient presses harder now that the pain in the cervix is gone; the muscles of the pelvic floor are said to relax also.

Stenosis of the vagina may occasionally give rise to dystocia. The stenosis results from old ulcerative processes, e. g., from puerperal fever, from previous confinements, e. g., hard forceps and scarring, or from gonorrheal vaginitis. There may be a congenital narrowness of the vagina, or there may be a septum which extends more or less far in the vagina (the relic of fetal development). Finally, the vagina may be relatively small. That is it may be normal, but there is some indication for the rapid termination of labor and the vagina is unprepared for it, e. g., cases of eclampsia and placenta previa.

Treatment of cases of pathological stenosis is—when they offer such resistance to labor that interference becomes necessary, to cut the bridges of scar tissue. If not possible or if too much tissue to sever, Caesarean section and subsequent amputation of the uterus, if the opening in the vagina is not large enough for the lochial flow.

Obstruction may be met at the vulvar outlet. Cases of concep-

tion through a pinhole hymen. At labor the hymen is distended over the head. From the pin-hole opening the bag of waters sometimes protrudes. Child may die, or case become serious from threatened rupture of the uterus.

Treatment—Incise the hymen laterally. The vulva may be scarred from ulceration. Treatment—Incision.

Sometimes meet a transverse ridge in the vulva analogous to the septum, sometimes in the vagina. Section of the band.

Tight Perineum—Cases where it is altered by old ulceration, or infiltration, or perhaps from bicycle riding, where it has been torn and sutured too high, in old primiparae and sometimes without any definable cause, the perineum is hard, not dilatable and may offer a hindrance to labor. This may also come from a tight vulvar outlet. Vaginismus—The skin is easily stretched, but just under this inside the vulva, can feel a tough ring. When the perineum offers an evident obstruction to labor the proper treatment is episiotomy. Usually an incision on one side is enough. Many a forceps operation may be saved by this simple operation, only the conditions must be recognized. Chloroform will relax a perineum that is spasmodically contracted.

The ring of Bandl sometimes is spasmodically contracted, and locks the body of the child in place. Hard to diagnose.

Treatment—Narcotics.

The membranes are sometimes a source of obstruction to labor and a slightly increased resistance here may be the cause of great delay. They may be either adherent over the internal os and lower uterine segment, thus preventing the dilatation of the same, or they may be so tough that they do not rupture when the cervix is dilated. In either case labor is delayed, in the one at the beginning, in the other at the end of the first stage. The second is easily recognized —delay after complete dilatation.

Treatment—Rupture the membranes after delay manifest for 1½ to 2 hours. Fix head from without over the inlet if not engaged, to prevent prolapse of the cord and extremities and be sure that there is no contracted pelvis or malposition of the presenting part. The recognition of the first is more difficult. By examination one may feel the adhesions and it is justifiable to separate them with the finger, gently and having assurance that the placenta is not nearby, which is not rare. If one does this and pushes up the head a little so as to allow a little liquor amnii to flow into the loosened membrane, thus forming a bag of waters, that will dilate the cervix, much may be accomplished.

In some rare instances it may be necessary to rupture the membranes even early in labor, but these conditions must be fulfilled:

1. The head must be engaged.

2. Pelvis not too contracted, outlet at least 8 cm.
3. Rotation complete or nearly so.
4. No anatomical rigidity of the cervix or vagina.
5. Presentation must be normal.

The parturient canal may be blocked at any point by tumors, extravasations, displacements of the cervix, vagina, by the full bladder, or rectum, etc., but the course is not long enough for their consideration.

OBSTRUCTIONS OF THE BONY PELVIS.

In 1572, J. C. Arantius, a pupil of Vesalius, discovered the contracted pelvis. In 1701, Deventer published a description of flat and generally contracted pelves, and is really the founder of the study. Michaëlis, who died in 1848, did the most for the study of contracted pelves and his work is classic now. Very recently Breus and Kolisko have published parts of a great work on the subject, which is more from the pathologist's than from the clinician's standpoint.

Contracted pelvis is more frequent than is generally thought. It was considered rare in the United States until accurate measurements showed otherwise. High degrees of contraction are commoner abroad because of the poorer population and the poorer foods, etc.

In Germany 14% of cases and in United States about 8% have small pelves.

Contracted pelves are of all degrees, first, the absolutely contracted, below 6½ cm., where a living child can under no circumstances pass; second, relatively contracted, from 6½ to 9; and the third class, from 9 to the normal.

The pelvis is by no means all important in labor. The size of the child and its position are of great significance. A large child may make a normal pelvis too small, and a relatively small one, absolutely contracted, and a small child may slip through a quite contracted passage. It is the *relation*, therefore, between the size of the child and of the pelvis that we must study. In the succeeding pages we will consider the child to be the average size.

The importance of contraction of the pelvis lies usually not so much in the actual diminution of the size of the passage to be traversed by the child as in the anomalies of position, of presentation and of attitude, of the fetus, and of alterations in the character of the pains, and the relations of the soft structures. The subject is thus very complicated.

The narrowing of the pelvis may occur in any plane, or in all of them, it may occupy one side, it may be typical and again all sorts of asymmetrical forms occur. Most often the inlet is contracted, but

the outlet is also found too small; of all the diameters the C. V. is the one commonly found to be at fault.

It is impossible here to describe all the varieties of deformed pelves. We will take up the most common. For clinical purposes we distinguish four kinds of pelves.

1. Those contracted in the anterior posterior diameter—flat.
2. Those contracted in all diameters—generally contracted.
3. Those flat and generally contracted.
4. Those asymmetrical pelves, a large group of rare forms.

The flat pelvis is usually rachitic, but there are cases without any signs of disease.

Factors in Formation of Deformities—The factors in the formation of the adult heart-shaped pelvis from the anterior-posterior ellipse of the infant are first, the inherent tendencies of growth, and second, the mechanical factors. The latter are better understood. They are three in number. The trunk pressure, the lateral pelvic tension, the lateral pelvic pressure. The weight of the trunk on the sacrum has a tendency to force this bone out from the ossa innominata. There is no wedge action to the sacrum. The trunk or body pressure likewise tends to throw the top of the sacrum down and forward, further it presses on the bodies of the sacrum and if these are not healthy interferes with their growth. The effects of trunk pressure are, first, by pushing the sacrum down and forward, it pulls on the sacro-iliac ligaments, tending to bring their insertions together; this tends to pull the ilia apart at their anterior junction, the pubis, which failing, owing to the rigid joint, the anterior wall of the pelvis nears the sacrum. This is the lateral tension. It resembles the stretching of a ring between two points—the ring becomes an ellipse. The body, supported on the femora, presses downward on them; they press upward (law of physics); since the heads are set at an angle, part of this upward pressure is deflected laterally into the pelvis. This is the lateral pressure, and it operates against the lateral tension. By a proper balancing of the three and proper tendencies of growth, the normal pelvis results. If one or the other factor is lacking or is exaggerated, one or the other deformity results.

The flat pelvis is the effect of too great trunk pressure acting on the softened bone, or too little lateral pressure.

The child with rachitis walks late, or sits in bed for months. The trunk pressure produces great lateral tension which is not offset by the lateral pressure. As a result the sacrum tips into the pelvis; the lower end, being held by the great sacro-sciatic ligaments, the sacrum becomes sharply curved and the ischiatic tuberosities strongly developed. The pressure also pushes the bodies of the vertebrae forward from the wings, and the lateral concavity of the bone

is destroyed. The pubis approaches the promontory and the heart shape of the inlet is changed to a transverse ellipse. The outlet is often enlarged.

The flat non-rachitic pelvis presents a mild degree of contraction without other signs of softening of the bones.

Labor in flat pelves is characteristic. One can usually diagnose the kind of pelvis from the character of the labor. Abnormal presentations are four times as frequent in flat as in normal pelves, and because the head cannot enter the pelvis it slides off to the side, which allows prolapse of the cord, of the extremities and later shoulder presentation. Owing to the fact that the head is retarded unequally, the various deflexion attitudes result, forehead, brow and face presentation.

To aid in this disturbance, pendulous abdomen is common, and this causes anomalies in the mechanics of labor. The combination causes anterior and posterior parietal bone presentations, which are more dangerous than the mechanical disproportion. In breech presentation the feet prolapse.

In primiparae these abnormalities are less common than in multiparae, who also lack the powerful, young, well-nourished muscular uterus. Contracted pelves, therefore, grow more serious with repeated labors. Labor is longer than normal, the bag of waters often ruptures early, which delays the dilatation of the cervix, because there is nothing to stretch it. Later the caput succedaneum may dilate it. After the cervix is open the head rolls into the pelvis, first the posterior parietal, then the anterior rolls in from behind the pubis. This may be seen by the impressions which the promontory makes on the scalp and skull.

The pains and the conduct of the uterus are highly important in these labors. Usually in flat pelves the pains are strong, sometime tumultuous, and endanger the integrity of the uterus (danger of rupture). These pains mould the head into the pelvis so that sometimes great disproportion is successfully overcome. After the head is pushed into the pelvis the patient begins to bear down, and sometimes complains of cramps in the legs, and desire to go to stool, three signs that the head is coming down into the pelvis. If the resistance is too much, the uterus thins out below, thickens above and unless relieved will tear at the weakest part, the lower uterine segment. The fetus escapes into the peritoneal cavity, a serious accident has occurred, ruptura uteri.

If ergot has been given, or if many examinations and operations attempted, the irritable uterus contracts tetanically. The child is locked in and all operative measures rendered laborious, if not impossible.

Dangers—The dangers of contracted pelvis are protracted labor

with sepsis and tympany uteri, rupture of the uterus, tetanus uteri, pressure necrosis of the soft parts between the head and the pelvis, resulting in fistulae connecting the bladder, vagina and cervix, or if less prolonged and less severe, resulting in local inflammation, which binds the organs together; further cystitis may result. Rupture of the symphysis, perhaps spontaneously; this and other injuries the result of operations more or less extensive.

Dangers to the child are—

(a) Asphyxia—

1. From the stasis of the blood in the maternal sinuses, caused by the frequent and prolonged uterine contractions;
2. From partial detachment of the placenta;
3. From prolonged cerebral compression;
4. From prolapse of the cord.

(b) Fractures of the skull, rupture of sinuses, sometimes occur spontaneously.

(c) Pressure necrosis of greater or less extent on the skull.

(d) Depression of the skull, groove or spoon-shaped depressions over the lateral plates of the skull, often due to the operative delivery, but sometimes spontaneous.

(e) Dislocation of the bones at the base of the skull and especially the separation of the occipital plate from the rest of the bone, causing direct pressure on the medulla or hemorrhage at the base.

(f) Cephalhematoma, often from a fissure of the bone.

Injuries of the body are common in operative deliveries, of which fractured extremities are common, tearing of the sterno-mastoid, with hematoma, and later wry neck, paralysis of the arm, due to traction on and injury of cervical and brachial plexuses.

Diagnosis of Flat Pelvis—History of rickets; shape of the head (square) rosary, deformity of the long bones and of the ends, interspinous diameter equals or is greater than the intercristous, small Baudelocque, low pelvis, vulva looks upward, narrow sacrum, short C. D., prominent ischiatic spines, straight sacrum, transversely, or from above downward. Convex from side to side—these are the signs.

Prognosis—Depends on the degree of the contraction, the *size*, the hardness of the fetal head, the number of pregnancies that have occurred, the condition of the uterus regarding strength and previous injury, the position in which the infant lies for delivery and the skill of the obstetric attendant.

Treatment—Requires the highest obstetric skill, and extensive experience, and even with both a physician will make mistakes. In contractions of the mild degrees, down to 9 cm. (i. e., a C. V. of 9 cm.) little is needed unless the child be large, or there is an abnor-

mal presentation, which is not seldom. Expectancy, general hygienic treatment and patience is all that is needed, but one must watch both mother and babe carefully. Hofmeier has recommended in these cases to press the head into the pelvis by direct pressure on the forehead and occiput fron outside—a little hazardous if the lower uterine segment is thinned. In the cases of greatest contraction there is likewise no particular difficulty in deciding what to do. When the C. V. is less than 6 in a flat and less than 6½ in a generally contracted pelvis, the indication is absolute—*Caesarean Section.* In pelves where the C. V. is from 6 to 9 we have many measures to consider:

(a) Expectancy; (b) prophylactic version; (c) symphysiotomy; (d) Caesarean section; (e) high forceps; (f) craniotomy.

Expectancy—Is used when the disproportion is not great, when the head is soft and easily moulded, the presentation and position normal, in primiparae with strong pains and when the patient is in good condition in every way. If the pelvis is moderately small it is sometimes surprising to see what nature will do.

Prophylactic version is hard to decide upon. (See later, Podalic version in head presentation.) If previous labors have shown that a full-sized baby can get through the pelvis, unmutilated but not alive, in going head foremost, one may do prophylactic version in the present labor. If the head is not engaged and there is indication for delivery, version. Abnormal presentations indicate version. One may, if there is time, induce labor a few weeks before term, when a head presentation is better.

Symphysiotomy—See chapter Symphysiotomy.

Caesarean Section—See chapter Caesarean Section.

High Forceps—In some cases of labor in contracted pelvis, the head comes into the pelvis with a large segment and the uterus grasps the fetus closely so that it cannot be turned. Here we stand before the alternatives—Symphysiotomy, Caesarean Section, Craniotomy. Craniotomy as a primary operation on a living child is not to be thought of. Caesarean section in a woman who is in poor condition—long labor, many examinations, etc.—is too dangerous.

Symphysiotomy may be considered if both mother and baby are in good condition. As a rule, experience has shown this to be the case; the accoucheur finds a head will not come into the pelvis; he allows the favorable time for version, and for Caesarean section to slip by. After a variable period (usually too soon) he essays the forceps; it fails; now there is nothing left but craniotomy or symphysiotomy, or pubiotomy.

If it is found after sufficient time for moulding has been given, that the head will not enter the pelvis, symphysiotomy should be proposed. If this is rejected, then a *trial* with the axis traction for-

ceps is in order. (See appropriate chapter.) If the forceps fails there is nothing but craniotomy.

Sometimes one makes arrangements for symphysiotomy, then applies forceps tentatively; if it fails the instrument is left on, the pubic joint opened and the infant delivered.

The axis traction forceps, in these cases, is an instrument of trial only.

Craniotomy is done in all cases where the child is dead, or dying, and as a last resort in delivery by other methods.

Generally Contracted Pelvis—This pelvis is not uncommon in its milder degrees, but rare in the graver contractions unless combined with the rachitic pelvis. It is a pelvis, small more or less evenly in all its diameters, but presents, too, some indications of the infantile form. May occur in large women, but usually in small. The bones may be thicker than normal, or perhaps gracile. In the former we get large external measurements and small internally, in the latter both are small. The sacrum is narrow, long, and higher in the pelvis. The anterior-posterior diameters are usually more contracted than the others. The diminution of the capacity of the pelvis is usually uniform all the way from the inlet to the outlet, which has great significance in the mechanism of labor.

The head enters the pelvis strongly flexed, even early in labor. Pains usually slow, because of slight pressure on the lower uterine segment, and the uterus is often infantile as well as the pelvis. Labor is tedious because the head meets with resistance all the way down, and has to be inserted to extreme dolichocephalia.

Diagnosis—This is not easy. Measurements only indicate the condition. Palpating finger learns by experience to estimate the size of the cavity.

Prognosis—Usually good unless contraction is marked; when there are the same dangers as in flat pelvis. Danger from pressure necrosis not so great, but there are dangers from the operative delivery so often needed.

Treatment—Version is not usually a good operation, because there is no room at the sides of the pelvis into which the head may be squeezed, while passing the narrow C. V. Forceps—dangerous to mother and child; almost equal to craniotomy. See treatment of flat pelvis.

Different Forms—A combination of flat and generally contracted pelvis occurs in rachitic women. Generally the pelvis is small, thin and almost always asymmetrically deformed. Labor presents particularly great difficulty and irregularity of mechanism common to both forms of pelvis.

Spondylolisthesis is a pelvis in which the last lumbar vertebral body has slid down over the sacral body into the pelvis. Due usually

to injury or congenital malformation of the interarticular process of the vertebra.

The funnel-shaped pelvis deserves more attention than it receives. This is a female pelvis of the masculine type. The sacrum curves forward, the tuberosities of the ischia run inward a little, the pubic arch is narrow, the outlet is narrow like a man's. This form of pelvis is more common than is generally believed and gives rise to delay in labor at the end of the second stage, to obstruction, to deficient rotation of the head, and may give trouble in delivering the shoulders.

Diagnosis—This is not hard. Two measurements of Breisky, distance between tuberosities of ischia, and from end of sacrum to subpubic ligament, also the distance between the spines of the ischii taken by means of the author's outlet pelvimeter.

Treatment—Watchful expectancy. Head almost always moulds and goes through. If delivery indicated, forceps—symphysiotomy, craniotomy.

Other pelves of interest are the kyphotic, the kyphoscoliotic, the osteomalacic, etc.

THE PASSENGERS.

The child may be too large, either as a whole or part of it, e. g. hydrocephalus, ascites, anasarca. It may have a very hard head, which is especially important.

The size of full term children varies within wide limits. The boys are larger than the girls, they have a larger bi-parietal diameter, and generally a relatively larger and more ossified head; as a result more boys die during labor. The children grow larger and heavier in succeeding pregnancies, until the seventh or eighth, when the weight is uniform. The largest children are born in the 28th to 35th year. The bi-parietal diameter of later children is larger than that of the earlier ones, the difference being 1 to 1½ cm.

The shape and size of the father's head has something to do with the question, but particularly of the mother's head, so it is said that the child's head is a miniature of its mother's. A large, heavy woman usually has a large baby; same true of short, fat women.

Diagnosis—Of a large head is made by abdominal palpation and mensuration of the head directly with the pelvimeter. Cephalometry is giving better results every year. A special instrument, the cephalometer, renders it very easy. The diameter of the pelvis in which the head happens to be must be considered. Results are clinically useful.

Delay in labor and all the signs and symptoms of contracted pelvis are caused by large and hard heads. Forceps sometimes needed. *Prognosis* not so good for baby.

Enlargement of the Shoulders—Girls not seldom give trouble here. The head comes through very well, but the shoulders are ar-

rested at the inlet, either by their large size or anomalous mechanism. The head springs back into the vulva, pressing it in between the tuberosities, unless delivery is soon effected the child dies of asphyxia. Hard to manage because the head is in the way.

Treatment—Have the patient bear down vigorously and aid same by Kristeller expression.

2. Try to rotate the shoulders into a favorable diameter by external and internal manipulation. Follow the mechanism indicated by nature.

3. Bring down the posterior arm into the pelvis and draw on this, gently. Do not break clavicle.

4. If last fails, bring down the anterior arm. It may be necessary, but rarely, to use brute force, and risk a fracture of the extremities.

If the delivery is obstructed by an hydrocephalus—puncture it; if by fluid in the chest or abdomen, evacuate it. If by anasarca, case difficult; morcellation.

Note—Now would follow errors of posture and abnormal presentation of the fetus as occipito posterior positions, deep transverse arrest, face, brow, breech, shoulder presentation, prolapse of the cord, arms, etc., but these we will take up under Operative Obstetrics, q. v. Also the anomalies in the delivery of the placenta.

COMPLICATIONS.

A labor may be complicated at any stage, or a complicated labor may right itself at any stage and then proceed normally. The complications about to be considered are not connected with the powers, the passages or the passengers. They are extraneous, and come from the side of the mother and from the fetus. We will give them in no special order. First, those on the part of the mother:—

PUERPERAL HEMORRHAGE.

Pregnancy brings with it a large number of physical conditions which predispose to hemorrhage. The normal function of labor is attended with hemorrhage and there are few conditions in pregnancy but hemorrhage forms an important part. An obstetrician, therefore, must get used to the sight of blood and must have all the means of hemostasis at his command, both those known to surgery and those which form a part of his special branch. The patient has acquired, by a wise provision of nature, a certain immunity against fatal hemorrhage, in that the amount of blood is increased and the power of clotting augmented, there being more fibrin. Still a large number

of women lose their lives from puerperal hemorrhage every year. It is therefore essential that you acquire a thorough knowledge of the methods of controlling bleeding in obstetric cases. This is one of the most dangerous complications of labor, and of the dangerous complications is the most common.

The possibility of hemorrhage begins with coitus. Cases of severe and even fatal hemorrhage from rupture of some vessel of the hymen or clitoris are on record.

During pregnancy the patient may have bleeding from ruptured varices of the vulva and this may be fatal. The rupture is due to excessive pressure and necrosis, or to wounding by scratching (because they itch) or from using a broken vessel.

The most common cause of hemorrhage in the early months of pregnancy is abortion. Threatening abortion manifests itself by pain and hemorrhage. In a few cases the pains cease, the bleeding also, and the pregnancy goes to term; more usually after a few weeks or days the hemorrhage recommences and the abortion takes place or the bleeding becomes so severe that operation is necessary. Very rarely the bleeding may continue several weeks. In the latter cases you must suspect myxomatous degeneration of the chorion, etc. This also causes bleeding, but there is more often a discharge of watery, bloody fluid and then the grape-like bodies.

In the latter months of pregnancy hemorrhage acquires much greater importance. There are three conditions attended with hemorrhage in the last three months of pregnancy, which must be borne in mind:

1. Placenta previa.
2. Premature detachment of the normally implanted placenta.
3. Sometimes beginning miscarriage shows itself thus, or a placenta marginata, but usually in these cases hemorrhage is a minor symptom.

PLACENTA PREVIA.

This condition formerly had a very high mortality rate, both for the mother and for the child. The outlook for the mother is now much better, if the proper treatment is done, but the percent. of deaths of the children is still high. There is also a difference between private practice and the hospitals, the mother standing a better chance in the hospitals. (Ahlfeld, 75% in private practice.) This improvement has been brought about since the Braxton Hicks version has been done in these cases. For a time the child was not considered at all, but recently the importance of the life of the child has been accorded more value in all cases, and also here, so that there is a diminution also of the infant mortality. Still, as a

general rule, unless you have things your own way, and the case well in hand, treat the child secondarily.

Causation—Placenta previa occurs once in 1,000 cases, but here there is the usual trouble in getting statistics. It is much more rare in primiparae (1:10) than in multiparae.

Predisposing Causes—

(1) Catarrhal endometritis the usual cause, and it need not necessarily be of marked degree.

(2) Dilatation of the cavity of the uterus, perhaps from catarrhal endometritis, or more frequently from subinvolution, or the two may go together. Has been noted that cases of placenta previa occur frequently in women who had had a placenta removed manually in previous labors (may be due to endometritis). Previous abortions; loss of the cilia through inflammation.

(3) Habit—Placenta previa has been known to recur seven times. Cases of three occurrences are not rare (may be due to the continuance of the endometritis). That the endometritis really plays such an important part is demonstrated by the findings on the placenta, white infarct, especially placenta marginata, thickened decidua, etc.

Acting Causes—

(1) Primary insertion of the ovum low down. Owing to the size of the uterine cavity or to the diseased slippery endometrium, the ovum finds no favorable point for adhesion; it slips down to the internal os; here the decidua has grown up and it comes to rest there.

(2) Hofmeier and Kaltenbach's view: That the decidua serotina does not offer enough surface for the nutrition of the ovum and the chorionic villi therefore grow in the decidua reflexa. Later, the decidua reflexa comes to be applied to the decidua vera, and may lie over the internal os. Many things in favor of this theory, but it presupposes a primary low insertion of the egg, and this may explain the lack of nutrition of the serotina. These two theories explain the large number of the cases, but a few other conditions deserve mention. The tubes in one case were found to insert in the lower uterine segment.

Definition—Placenta previa is the development of the placenta in toto or in part, in the lower uterine segment. Depending on the extent of the lap over the internal os, we speak of placenta previa marginalis, when just the edge of the placenta is palpable in the os; placenta previa lateralis, when one-half of the os is covered by placenta—placenta previa centralis when the finger feels placental tissue all around. Of course, placenta previa centralis may become lateralis when the os dilates more, or a lateralis may appear more marginalis. Thus the terms are relative, and clinical.

Some authors distinguish complete and partial placenta previa. The most prominent symptom of placenta previa is hemorrhage.

Hemorrhage—This is at first usually slight, occurs in the later months of pregnancy and is accompanied by uterine contractions. These may be felt by the palpating hand, but not by the patient. The severer the hemorrhage, the surer is the occurrence of labor.

How to explain the hemorrhage has not been definitely settled. During the latter months of pregnancy, owing to the painless uterine contractions, the lower uterine segment is being formed. This causes a retraction of the fibres of the lower uterine segment, by which they are drawn up to form part of the body of the uterus. The placenta does not grow so rapidly that it can keep pace with the retraction of the lower uterine segment, therefore the place of the insertion gets larger than the placenta and a slight separation takes place. This, of course, becomes most marked during the first stage of labor. If the bag of waters is ruptured, the placenta can lie flat on the wall of the lower uterine segment, and can be drawn up with it, becoming, so to speak, part of the lower uterine segment. This explains the cases of spontaneous cessation of the hemorrhage when the bag of waters ruptures. It is easily seen that the hemorrhage is the result of factors over which we have no control, and the hemorrhage has been called "unavoidable," to distinguish it from the premature detachment of the placenta, which is "accidental" hemorrhage. Still, we cannot eliminate trauma. Owing to the exposed position of the placenta, a slight trauma, as straining at stool, or coitus, may bring on the bleeding. Further, the low situation of the placenta, so near the infected vagina, predisposes to inflammatory adhesions of the placenta, and finally even to infection after the third stage. Two important points. The hemorrhage comes almost entirely from the mother, the separation occurring at the expense of the mother, it is the maternal blood vessels that are opened. The fetus may also bleed if by a careless examination some of the vessels in the placenta are torn. But usually the fetus dies of asphyxia, from compression of the placenta, especially at the insertion of the cord or because the blood of the mother, who has bled so much, cannot supply it with enough oxygen.

In cases of placenta previa centralis the separation is earlier in pregnancy; therefore, hemorrhage earlier, and is more extensive; therefore, hemorrhage greater; which are clinical facts and which make the prognosis worse in these cases.

Clinical History—It is possible that many cases of abortion are cases of placenta previa, the exposed position of the ovum tending to make it more susceptible to accidents.

The main symptom is hemorrhage. Some time after the seventh month there is painless uterine hemorrhage. It may or may not

be accompanied by uterine pains. The causeless nature, its suddenness and the absence of any pain are so marked, that the combination is characteristic. Therefore, *sudden, painless, causeless hemorrhage* occurring in the last three months of pregnancy, is almost always placenta previa.

The first hemorrhage is usually slight and ceases, the patient going about her affairs. After an interval of two weeks, sometimes earlier, there is a repetition of the bleeding. This time it is more severe and may be fatal, or the first hemorrhage may be fatal. This usually depends on the insertion of the placenta. If central, the hemorrhage is severe and occurs earlier. In certain cases there is a continual oozing of blood which may not appear alarming, but which brings the patient into a very anemic condition and makes her very susceptible to even a moderate loss of blood at labor. This is called stillicidium sanguinis.

With the second hemorrhage labor usually begins. Rarely a second interval. The patient may go to term, and after the labor the placenta is found altered, where it hung down into the lower uterine segment, into a hard membraneous lap resembling a blood mole. These are cases of spontaneous cure of placenta previa. They are rare and are not to be counted on in practice.

In cases of marginal placenta previa there may be a slight hemorrhage just before the bag of waters ruptures, but no other symptoms during the labor. After the labor the placenta is found to have been very near the internal os, its edge having been overlooked. The prognosis is good for both mother and child here. In the other cases unless aid is rendered the woman, she and her offspring die. The hemorrhage that is the least is the first, and each succeeding one is severer, but the first may be very serious.

Diagnosis—Symptoms—*Sudden, painless, causeless uterine hemorrhage*, in the latter months of pregnancy.

Findings Abdominally—May feel soft body over the head in the inlet. Reliance not to be placed on it. Right side more usually involved.

FINDINGS VAGINALLY.

Boggy feeling in the vaginal vault, great succulence of the parts. Head felt indistinctly, as though it were through a flat sponge, or felt plainly on one side and thickly on the other. Pulsating arteries have but little significance. Breech or shoulder may give the feeling of a soft body. Only certain diagnostic sign is the feeling of the spongy placenta, through the internal os. The only conditions that could simulate the feel of a placenta are thick vernix caseosa on the head, some monstrosity presenting an uneven surface, thick mem-

branes, or hemorrhage between the two membranes, and a blood clot. If you keep these in mind such mistakes will not occur. In some cases you feel only the thickened membranes over the internal os and have to go up the side to feel the placenta. Palpate gently so that you do not tear the placenta and cause fatal hemorrhage. The head is usually not engaged, being prevented by the bulky placenta.

Prognosis—Formerly 25% to 30% of the mothers died, either from hemorrhage or sepsis and occasionally from air embolism. Now the maternal mortality, owing to better treatment, has been reduced to 4%. Hirst, 1%. If you have a case from the start, where the woman has lost only a small amount of blood, she should not die, unless by some accident, e. g., air embolism. The greater tendency to sepsis should be remembered, because the placental site is so near the vagina and because of the many and rough manipulations necessary.

For the fetus the prognosis is bad, 50% to 75% die.

First, they are generally prematurely born and may die in the first days of life; second, the means of controlling the hemorrhage are often such as to compromise the life of the fetus by pressure on the placenta, tearing the placenta, slow extraction; third, there may be slight hemorrhage (fetal), and the fetus illy affords a loss of blood, however small; fourth, displacement of the placenta before or with the child at a time when the cervix does not permit immediate delivery, and warns against forcing the dilatation and extraction.

Treatment—The treatment of placenta previa has become much more rational and certain than that of any severe obstetrical complication. This cannot be said of eclampsia. Here the treatment is still uncertain.

Definite principles in the conduct of these cases may now be laid down.

The prophylactic treatment of placenta previa is of importance but cannot be carried out, because the case usually occurs among the poor people. Cure endometritis.

Dr. W. W. Jaggard made the following propositions, which I have found very good guides in practice:

(I) *There is no expectant plan of treatment for placenta previa.* Since the child is almost always viable ,there is no excuse for waiting. The hemorrhage is "unavoidable." It may occur in the night, and the woman may die before aid can reach her.

(II) *Physician's duty to stay by his patient till she is delivered and out of danger.* Somebody must be at her bedside till all danger is past.

As soon as the diagnosis is made, two propositions must be laid before the patient and her family: First, she must submit to the

induction of labor; second, she must go to a well appointed hospital and await there, *in bed*, her confinement, it being understood that if at any time the hemorrhage becomes profuse the pregnancy is to be interrupted. If she assents to neither proposition, it is advisable to drop the case. If the bleeding stops or becomes insignificant, one is encouraged in waiting, but a hemorrhage that recurs more than twice, where clots are passed, requires interference. If, then, labor does not come on itself, it must be induced. I prefer to begin in the A. M. (unless there is indication to interfere without delay), puncture the bag of waters, put in a colpeurynter, draw on same and stay by the patient till all danger is over. If the woman is found bleeding profusely, labor having started, the following is the course to pursue:

The aim of the treatment is: first, to stop the hemorrhage; second, to empty the uterus; third, to get retraction and contraction of the uterus. The method of treatment to pursue depends on the state of the cervix.

(I) If effaced and os dilated the proper treatment is to rupture the bag of waters and extract. If conditions for forceps are present, use it; if the breech presents, extract by the breech. If the head is movable above the inlet, version, and extraction; if there is an indication when the version is completed. Be sure the os is completely dilated.

(II) If the cervix will just admit two fingers, as this is the usual case, there are two methods of treatment.

The first, the oldest, and a thoroughly reliable method, is: Rupture the bag of waters, do Braxton Hick's version, bring down a foot till the breech is well into the lower uterine segment, then surrender the case to nature. Do not attempt to extract, because you will tear the cervix to the peritoneum, and then the death of the mother is certain (from hemorrhage). Even a slight or a superficial tear when the placenta is inserted in the cervix is of serious moment, as the placental uterine sinuses being superficial and the retractive power of the lower uterine segment being slight, a tear of one of these large blood vessels results in a furious and obstinate hemorrhage, which, in a woman already anemic, is more easily fatal.

After bringing down the leg, the breech tampons the lower uterine segment, prevents further bleeding, and also elicits pains, so that labor is spontaneously terminated in a few hours. If the hemorrhage should recommence, pull down a little on the breech and may repeat this. This method of treatment is an excellent one, but the chances for the fetus are quite small.

Second Method—Is the intra-uterine colpeurysis, first employed by Mäurer and improved by Dührssen and Champetier de Ribes,

particularly Dührssen: Rupture the bag of waters and pass the Carl Braun colpeurynter inside the membranes. Now inject one-half pint of some weak antiseptic solution, clamp and attach a tape with a bottle hanging over the foot of the bed so as to regulate the amount of tension. This is about two pounds, often one pound is enough. This acts like the breech, presses the placenta against the lower uterine segment, elicits pains, stops hemorrhage, dilates cervix. Watch the patient carefully. The bag may elicit too strong pains, which endanger the uterus. After thirty minutes to two hours, the bag is expelled. The cervix is now large enough to do a version, and this should be done; or the bag may be re-introduced and dilated so large that when it is expelled the passages are sufficiently dilated to admit the immediate delivery of the child. Some accoucheurs put a bag in the vagina to dilate it also. In lateral placenta previa these manipulations are made through the opening in the membranes. In central placenta previa the opening must be made through the placenta. This, of course, makes a bad prognosis for the child.

(III) In primiparae, placenta previa is luckily quite rare, but when it occurs it is a most formidable condition. The reason is that the tight cervix, vagina and vulva are bad hindrances to the proper treatment. If the cervix is not dilated enough to get in the Braun's Colpeurynter (Dührssen has succeeded in doing this when he could just get the index finger through), you must stop the hemorrhage till the cervix is at least dilated for two fingers. Two methods: *Vaginal Tampon and Colpeurysis.* Of the two (both are bad because of the danger of sepsis and incomplete hemostasis), the tampon is the better. Do not leave it longer than eight hours. It is hard to apply properly, hard to keep aseptic, and still may allow internal hemorrhage or oozing alongside the tampon. Therefore, *do not leave the patient,* trusting to the tampon. Put on a tight abdominal binder to force the uterus down on top of the tampon. After the os has dilated the treatment is the same as given.

Other treatments: e. g., dilate the cervix by Barnes' bags. Vagina with colpeurynter. Perhaps head may come into the pelvis, then hemorrhage stops, then leave case to nature. If placenta marginalis, puncture bag of waters and wait; if no hemorrhage, all right; if there is after this, same treatment as before given. Caesarean section is recommended for cases of central placenta previa, at term, with living child, under favorable conditions.

Treatment During Third Stage—The treatment during the third stage is highly important. Owing to the inflammatory conditions during pregnancy, the placenta has usually become somewhat adherent to the lower uterine segment, and may, therefore, give rise to severe hemorrhage and the retention of pieces of the placenta. Fur-

ther, the lower uterine segment is not so well provided with muscular fibres and, therefore, the placental site does not retract and close off the vessels; therefore, greater hemorrhage from uterine atony. Finally, during the extraction, which might have been undertaken too soon, the cervix may have been torn, and from here we get the worst hemorrhages. The soft vascular cervix is more likely to tear and these tears bleed very profusely, because the vessels of the placental site are so large and numerous.

Hemorrhage after the expulsion of the placenta, therefore, is due to cervix tear or from atony uteri. A woman who bleeds and whose uterus is hard, generally has a cervix tear (or a vulva tear). Examination will show this. Sew up the tear or pack the uterus, the lower uterine segment, and the vagina tightly with lysol gauze. Pack soon, i. e., don't waste time trying inefficient kinds of treatment. Treat the anemia. This will be considered under post partum hemorrhage.

During the puerperium there is greater tendency to infection; 1st, because of the necessary, continuous and sometimes violent manipulations during delivery; 2nd, because of the exposed position of the placental site,—near the septic vagina; and, 3rd, the anemia of the woman weakens her resisting powers. Therefore, be extra careful.

PREMATURE DETACHMENT OF THE NORMALLY IMPLANTED PLACENTA.

The placenta is normally inserted near the fundus uteri, on the anterior or posterior wall, seldom in the fundus, but seldom on the side; more often posteriorly than anteriorly. The normal separation of the placenta is attended with hemorrhage, but when the uterus is emptied, or even when it can contract down well on the placenta, there is no further bleeding. Should the separation occur during pregnancy, while the child is still in utero, this contraction of the organ is not possible and, therefore, the woman bleeds interruptedly, either internally or externally. The accident is quite rare. Up to 1870, Goodell, of Philadelphia, collected 106 cases (of which 54 mothers died). Since then cases have been published more frequently, so that it is probable that the cases are occasionally overlooked. I think it is not so rare, have had 18 cases.

Causes—

(1) Chronic decidual endometritis: The blood vessels are fragile (which is true even of the healthy decidua), and sometimes slight trauma ruptures one. The slight hemorrhage started leads to a larger one, till the whole placenta is separated.

(2) Chronic nephritis. With numerous white infarcts. Chronic peritonitis has been demonstrated. Under this head would also come acute infectious diseases, because of the numerous hemorrhages in the maternal decidua.

(3) Irregularities of the circulation; e. g., Morbus Basedowii said that even excitement will do it; usually some pathological condition at base.

(4) Trauma—Fall, turning in bed, striking against a table; but there is generally some pathological condition of the decidua, which predisposes to it, or the placenta may be on the anterior wall and exposed.

(5) During the delivery of the trunk in breech presentations there is a separation of the placenta. Also, after first twin, the common placenta may be displaced and the second fetus die of asphyxia. French authors mention a too short cord. Seems to be some relation between this accident and rupture of the uterus from the peritoneal side.

Symptoms—The severity of the symptoms depends on the amount of hemorrhage, and this depends on the degree of separation. As a rule, the case appears alarming from the start and medical aid is summoned early.

Sudden pain in the abdomen usually located where the placenta is, on the right or left side, generally the right. Distension of the uterus and abdomen; cessation of fetal movements and heart tones; signs of anemia rapidly develop and become severe; collapse in bad cases. Woman may bleed to death without one drop of blood appearing externally. The placenta may lift itself up in the middle, remaining adherent by the edges, and there is room for a large amount of blood which makes a prominent tumor on the outside of the uterus. Later, the blood can work its way down between the membranes and the uterus, appearing externally. Or the bleeding may take place into the liquor amnii, the membranes having ruptured over the clot. This is denied by some authors, but it is possible. The uterus is immensely distended by the blood and the patient may perish; or the hemorrhage may be entirely external (good prognosis). Sudden increase in the size of the uterus, tension of the abdominal parietes, acute pain referred to the placental site, and after a while hemorrhage externally, with the general symptoms of a more or less severe anemia, constitute the classical symptoms of this accident. This is the so-called "accidental" hemorrhage. The placenta may prolapse and come to lie over the internal os, making diagnosis difficult.

The symptoms of hemorrhage are: Faintness, dizziness, shortness of breath; patient yawns or sighs frequently; praecordial anxi-

ety and oppression, palpitation, ringing in the ears, spots before the eyes, or patient sees everything black; thirst.

Signs—Patient pale, prostrate, white gums, eyes fallen in, pearly conjunctiva, cold extremities and nose, which perhaps is bluish; pulse rapid and weak and compressible. Later, fainting, vomiting, unconsciousness, delirium, followed by convulsive movements. Excessive thirst, cramps in the muscles and fainting are bad symptoms; then, when the urine and feces are discharged involuntarily, the patient soon gets a few convulsive spasms and dies.

Diagnosis—Lies between ruptured uterus; placenta previa and extra uterine pregnancy. Examination of the abdomen excludes the first and the last. Symmetrically large, tense, painful, uterus, excludes them. The history, the severity of the pain, the presence of the uterus one side and the child free in the abdominal cavity, shut out rupture of the uterus. Internal examination will show uterus small and empty in extra uterine pregnancy and rupture of the uterus.

Placenta previa is excluded because you feel no placenta over the internal os. Usually diagnosis is difficult, unless case known before. May need abdominal section to prove conditions and cure.

Prognosis—Worse than placenta previa. Goodell, 54 from 106 mothers and only 6 living children. Later statistics are not so bad. Danger to mother is hemorrhage, and the severe operations necessary. Dangers to the child are asphyxia from separation of the placenta.

Abruptio Placentae.	Placenta Previa.
Symptoms.	
1. Sudden severe onset.	1. Rather quiet onset.
2. Pain, generally referred to placental site.	2. No pain, unless uterine contraction.
3. Hemorrhage, internally or externally, after a while.	3. Hemorrhage always external at start.
4. Hemorrhage, severe,—internal or external.	4. First hemorrhage generally mild.
5. Only one hemorrhage usually.	5. Several, or history of several.
6. May find a cause,—injury, jar, etc.	6. Usually no cause, may be.
7. Symptoms of a severer hemorrhage than the amt. of blood externally shows.	7. Symptoms proportionate to the amount of blood lost externally.
8. Cessation of fetal movements.	8. No change usually.

Abruptio Placentae.	Placenta Previa.
Signs.	
1. Abdomen distended, tense and painful.	1. Abdomen as usual at time of pregnancy.
2. Uterus tense, can't feel fetus.	2. Uterus soft unless there is pain.
3. Fetal heart tones absent.	3. Almost always present.
4. Vaginally, no placenta over internal os.	4. Placenta over os.
5. Bag of waters tense,—feel hard.	5. Bag of waters loose; usually head not engaged.

Treatment—Of premature detachment of the placenta. Cannot formulate hard and fast rules, as in placenta previa. In general, the best treatment is that which empties the uterus quickest and with least danger to the mother. Object is to empty uterus as quickly as possible, to enable it to close off the bleeding vessels. Secondly, you must treat the anemia.

(a) If the cervix is effaced and the os dilated, extract the child either after version or by forceps, if the head is engaged; labor almost always commences and proceeds rapidly.

(b) If the os is not dilated, put in a Barnes' bag, give the patient ergot, ½ dr., every 20 minutes; tight binder; hand on uterus and pulse.

(c) If hemorrhage continues, puncture bag of waters. Do intrauterine colpeurysis. Give ergot. *No* vaginal tampon.

Dangers are:

1st. There is now more room in the uterus and it is filled up with blood.

2nd. The sudden loss of the fluid may be just enough shock to turn scale against woman.

3rd. The bag of waters being gone, the cervix dilates poorly, and all operation made difficult.

(d) If the situation is grave, saline solution under the skin, dilate os with colpeurynter, and Barnes' bags, or the fingers, incise the cervix laterally, deliver and stand ready for all complications. Bad cases; consultation. Explain to the family.

Caesarean section proposed as a method to deliver rapidly the patient, and avoid all dangers from delayed vaginal delivery; also, vaginal Caesarean section. Both may be used in selected cases and proper surroundings.

Other Forms of Hemorrhage—A form of hemorrhage that sometimes occurs at the time of rupture of the bag of waters has its

origin in a tear of one of the vessels of a cord that is inserted into the membranes, i. e., velamentous insertion of the cord. The tear in the bag of waters extends through one of these vessels if they should happen to lie across the internal os. Of course, the danger is entirely fetal, and death occurs from hemorrhage. If the child is born quickly it may still come living, but usually it dies as a result of this anomaly. Diagnosis may be made if vessels are felt in the membrane before they rupture. Rarely done, but may need to differentiate the forelying cord. If diagnosis made before rupture, delay the rupture of the bag of waters as long as possible, i. e., by the colpeurynter. When the cervix is ready, rupture bag of waters, and extract quickly. After rupture, the condition may be suspected by the hemorrhage, which comes with the liquor amnii. If the child is dead, await natural termination of labor or perforate. Happily, the cases are rare.

During labor another form of hemorrhage occurs. It is due to the loosening of the placenta from a too sudden evacuation of the liquor amnii. During the pain a small amount of blood is forced out, or some blood-stained liquor amnii. When the head is pushed up, blood flows down into the hand. Cases are quite rare because the placenta can generally accommodate itself to the diminished size of the uterus. The condition and its treatment are similar to premature detachment of the normally implanted placenta.

The loosening of the placenta is cause of asphyxia and still birth, the child dying during a prolonged second stage. These deaths are actually preventable and the accoucheur is responsible. Watch the heart tones during the second stage.

Another form of hemorrhage during the latter part of pregnancy is from rupture of the circular sinus of the placenta. Blood comes from the mother. Not dangerous. Diagnosis difficult, usually by exclusion. Treatment the same as for premature detachment.

POST PARTUM HEMORRHAGE.

The loss of blood during labor varies from 225 to 300 grammes, but may go as high as 500 without being pathological or making any effect on the condition of the woman. A loss above a pint is pathological. Bloodless labors are very rare, are not normal, and are usually found where the fetus has already been dead a long time and thrombosis of the placental site has occurred. Cases of leukemia also are said to be bloodless. When the blood gushes from the vulvar orifice, or oozes steadily after the placenta is expelled, the case is pathological. During the first two hours after labor a puerpera should not lose over two ounces of blood. Normally, the placenta begins to separate while the last parts of the child are leaving the

uterus. There are three factors which bring about this separation: (1) The retraction and contraction of the uterus, the lessening of the area of the placental site. (2) The formation of the retroplacental blood clot. (3) Gravity, to a slight extent. At the end of 15 to 30 minutes, the placenta is almost always separated and has dropped down into the lower uterine segment. The blood vessels of the placental site have been torn across in the line of separation. The hemorrhage is prevented by.

(1) The retraction of the muscular fibres and the superimposition of the muscular lamellae on each other.

(2) Thrombosis of the veins, and, to a less extent, the arteries. This is called "puerperal thrombosis," and extends only a short distance into the uterine wall. If the thrombi pass through the uterine wall the thrombosis is pathological. The thrombosis is less important, since in some cases of puerperal fever the clots are dissolved and there is but rarely any hemorrhage.

Anomalies of retraction and contraction are the more usual causes of post partum hemorrhage, the thrombosis, except in cases of hemophilia, being usually present; but if the uterus fails to contract, the thrombosis will rarely stop the hemorrhage. Cases of really severe post partum hemorrhage are rare. Impossible to get statistics. They are mostly errors of art. Statements made that all cases of post partum hemorrhage can be prevented is not true. The cases are rare where the bleeding cannot in a great measure be prevented, or at least the patient be saved from death.

Causes—

(1) Laceration of the vulva, vagina, cervix. These are the causes more often than is thought, the hemorrhage being ascribed to uterine atony. The uterus has great power of contraction and will contract even after the death of the mother, but still atony may be the cause.

(2) Uterine Atony—This is due to: (a) Precipitate labors, therefore post partum hemorrhage, common in multiparae. (b) Too rapid extraction, by forceps, breech or after version. The too rapid emptying of the cavity of the uterus; it must have a little time to readapt itself to the diminished cavity. Paralysis of the placental site.

(3) Primarily weak pains. Either due to some malformation of the uterus, double or single-horned uterus, maldevelopment of the uterus, or to some tumor in the uterus causing faulty contractions, pre-eminently uterine fibroids, uterine adhesions, or to the general weakness of the mother. Uterus fatigued from long labor. Well-known clinical fact that post partum hemorrhage occurs usually in weak women and not so often in the strong, robust working women.

(4) Too frequent pregnancy. This weakens the uterine contractile power.

(5) Excessive dilatation of the uterus, twins, hydramnion.

(6) Habit. No definable cause. Probably chronic endometritis or metritis.

(7) Too hasty expression of the placenta. Interference with the normal progress of the third stage. In these cases the rough manipulation forces out the clot, the placenta may not be fully separated and hemorrhage results.

(8) Partial adhesion of the placenta, or retention of a clot or a piece of placenta or thick membranes.

A rare cause of post partum hemorrhage is hemophilia. That all bleeders do not die of post partum hemorrhage is shown by the fact that bleeders propagate their kind. If the mothers died in childbirth the family would soon be exterminated, since the tendency is said to be transmitted on the mothers' side. Said that chloroform and quinine predispose to hemorrhage; some truth in it, also in some blood dyscrasia, e. g., malaria, syphilis.

Diagnosis—This is of great importance. Must distinguish first, when the placenta is in the uterus, and after the expulsion of the placenta. We find two conditions with hemorrhage during the third stage:

(A) The uterus is large, soft, near the liver, doughy, hard to find. These cases are usually where there is a large placenta, and there has been a precipitate labor, or where there is a total or partial adhesion of the placenta. The hemorrhage may be entirely internal, and exit of the blood being prevented by the bend in the cervix, due to the extreme anteflexion of the uterus, to the covering of the cervix by a blood clot, or a piece of membrane.

(B) The uterus may be hard, well contracted. In these cases, which were formerly called "hour-glass contraction" of the uterus, the placenta may be adherent in part, but more often incarcerated. Uterus below level of navel. Traction on cord would pull down uterus. The placenta may be retained because of the stricture of the contracting ring, or because of its size.

It is not always possible, where the placenta is in the uterus, to make a diagnosis of a tear in the cervix which may be causing the hemorrhage. If the bleeding comes from a vulvar tear, it is possible to see it. It is important, therefore, in cases of doubt, to express the placenta as soon as possible. If the uterus contracts well after the expulsion of the placenta, the hemorrhage ceases if it was from the uterus, if from the torn cervix or vagina, the hemorrhage continues. Examine with two fingers. This is necessary to diagnose cervix tears, and then consider the operation, forceps, version, etc., as likely to produce lacerations. Think of rupture of the uterus, too.

After the Expulsion of the Placenta—Here the diagnosis lies

between atony of the uterus and injury to the genital passages. Only in extreme cases of atony is the bleeding arterial, almost always it is venous; in injuries the hemorrhage is usually arterial. You suspect vulvar and vaginal tears in forceps cases. You suspect cervix tears after breech extraction and version. In general, when the uterus is well contracted and there is hemorrhage, it comes from some injury. An examination per vaginam settles the point.

Another point in the diagnosis is, is there a piece of placenta or a placenta succenturiata retained in the uterus? Examine the placenta carefully, and if in doubt, the woman bleeding, examine the uterus. Sometimes the uterus relaxes, a clot forms, and then this acts like any other foreign body which must either be removed or expressed by the fingers.

Treatment—Prophylaxis. This is important and must begin with the first stage of labor. Keep up the woman's strength, by giving nourishment and needed rest. Do not empty the uterus too rapidly. When the head is born let the uterus expel the rest of the child, do not drag the child out of the uterus. Have a hand follow down the fundus as the child leaves it. Do not try to hasten the third stage by an early Credé expression, and do not manipulate the uterus too much, no massage unless the patient bleeds or there is internal hemorrhage. After the third stage, in suspected cases, give ergot and keep up massage or control for one hour at least.

(A) *Treatment During Third Stage*—When the placenta is still in the uterus: Massage vigorously, fingers behind, thumb in front. After uterus contracts, hemorrhage almost always ceases. Keep the hand on the uterus to see that it does not relax and bleed again. If the hemorrhage persists you must empty the uterus. Rub it vigorously and in the moment of contraction squeeze out the placenta, i. e., Credé; repeat the Credé three times, remembering the three points: 1, uterus contracted; 2, uterus in median line; 3, bladder empty. A full bladder can cause retention of the placenta, and also post partum hemorrhage. If this is not successful and placenta is abnormally adherent, it must be manually removed. In rare cases it is not possible with massage to get the uterus to contract sufficiently to express the placenta when the uterus is relaxed, and, further, it is not safe, nor feasible. In these cases a hot vaginal douche will usually cause uterine contractions, but if the hemorrhage is severe must go in and remove the placenta by the hand, there usually being no time for uncertain methods.

Manual Removal of the Placenta—Is one of the most dangerous operations in obstetrics. The danger of infection is enormous. Over 25% have severe febrile symptoms (better results now with asepsis, and rubber gloves).

Chloroform the patient deeply; now try the Credé again. Very

often it now succeeds, which is fortunate. Careful scrubbing of the genitalia and vaginal irrigation with hot lysol, 1%.

No case so urgent that the antisepsis can be neglected. Particular attention to the finger nails, singe the hair off the back of the hand if too long; use alcohol before the bichloride, and, best of all, use sterilized rubber gloves. When everything is ready pass the hand along the cord to the placenta. Push the membranes over the fingers between the placenta and the uterus (Hildebrandt), and, while the other hand outside steadies the uterus, the fingers, with a gentle sawing movement, separate the placenta from the uterine wall. It is generally very easy, but in rare cases the adhesions are firm and have to be cut with the finger nails. The uterus contracts well down on the hand and after the placenta is separated usually expels both the hand and placenta. If the contraction ring is tight, gentle pressure, chloroform and waiting a little will almost always overcome the resistance. Under no circumstances use force. After removing the placenta, go through the lysol again and make a careful revision of the uterine cavity to see if there is not a piece still left. If using rubber gloves, wrap a piece of gauze around the two middle fingers, using this to wipe the uterus smooth. After this, a hot uterine lysol douche (1%), allowed to flow for two minutes. Give ergot. Do not give ergot as long as placenta is in utero.

Rare cases where a sudden enormous hemorrhage follows the delivery of the child, compress the aorta, grasp uterus from within and without. Valuable to force lower uterine segment through contraction ring and massage until internal hand is forced out—S.

Treatment After Expulsion of the Placenta—In all cases make a careful examination of the placenta. If a piece larger than an English walnut is missing, go into the uterus for it (with the precautions already mentioned), and do this always, if the patient bleeds. If smaller than this size, leave it alone; massage, ergot, wait. It will usually be expelled in the first days of the puerperium, but they sometimes become infected. If the hemorrhage is from a cervical tear, sew up the rent, or pack the utero-vaginal tract full of gauze.

(1) In all cases massage the uterus briskly. Knead it well, and usually one succeeds in stopping the hemorrhage by this simple means. If the uterus is full of clots, squeeze them out, but not too often.

(2) Give ergot, 1 drachm by mouth, minims 25, hypodermically. Squibbs fluid extract, or Sh. and D. ergotole, or ergot, aseptic, P. D. & Co.'s. But do not wait for the ergot. Get contraction and retraction yourself. Do not rely on ergot to do it, you may be disappointed. Proceed as if none had been given. *Law of Pajot*—"Never give ergot when there is anything in the uterus."

(3) Give the patient a hot uterine antiseptic douche, tempera-

ture 120 degrees Fahrenheit, or as hot as she can stand it. It is not advisable to use cold water, or ether, poured on the abdomen, nor is it advised to slap the abdomen with a wet, cold, towel. I think these are all too depressing, especially when the patient has lost a great deal of blood. Heat is needed.

(4) Old and tried method: Squeeze a large pledget of cotton, soaked in vinegar, in the uterus. Mode of action is by irritation of the endometrium, and this is needed when the patients are anemic. Do not use the Tr. Ferri Chloridi for this purpose, because it makes a thick layer of coagulated fibrin, which is so much dead matter and predisposes to sepsis; further, the thrombi may extend through the uterine wall and give rise to emboli. Not necessary and bad.

(5) Compress the uterus in anteflexion. Breisky's method. Good to gain time, may keep it up for ten minutes, till hot douche is ready or ergot has begun to act.

(6) Massage uterus outside and inside.

(7) If the hemorrhage still persists, compress the abdominal aorta—Nos. 5 and 7 may also be used in these severe cases, where the hemorrhage comes with a gush, and something must be done instanter, or the patient is lost.

(8) Tampon the uterus with lysol gauze. It takes 10 or 12 yards, one-half yard wide. Tampon tightly the whole parturient canal. Leroux used medicated tampons in the uterus for post partum hemorrhage, in 1776, but Dührssen brought the scientific uterine tamponade to the notice of the profession in 1887.

During this time, or immediately after you have gotten the hemorrhage under control, you will have to direct your attention to the treatment of the more or less profound anemia. The symptoms of anemia have already been given. In treating the anemia there are several conditions to be fulfilled.

(a) Remove the cause of the anemia, i. e., stop the hemorrhage.

(b) Keep up the body heat. Do not allow the patient to get cold. In the hurry that almost always attends these cases, this point is likely to be forgotten. Patient should be well covered up and hot water bottles be applied to the feet, sides and arms. See that they do not burn the patient.

(c) Keep up the heart's action and supply the brain with blood. Death is usually due to cerebral anemia from the empty cerebral vessels. The blood vessels, especially those going to the brain, must be kept full. (1) Stimulants, hot coffee, wine or whisky. For more rapid action give strychnia, gr. 1/30, repeat in one hour. Camphorated oil, one hypo. barrel full, repeat every twenty minutes until three barrels. Ether in the same way and dose, deeply in the thigh; these two have a powerful stimulating effect. Also, aromatic spirits of ammonia.

Now to supply the brain with blood. Elevate the feet, let the head hang low, perhaps necessary to elevate the foot of the bed, which should be raised three feet. Auto-infusion, i. e., circular bandaging of the legs and arms, not of much value and risky.

(d) It is possible to increase the total quantity of blood in a short time by means of free exhibition of fluids. 1st. By mouth, but careful not to cause vomiting, which, especially in anemia, is likely to occur and be a very annoying symptom. Sometimes patient feels better after vomiting. 2nd. By rectal injections. Normal saline solution, warm. Not advisable to use whiskey and coffee, as they usually come out and then the rectum is intolerant of anything else. After the salt solution is in, compress the anus for ten minutes. 3rd. The direct transfusion of blood is no longer practiced, but a solution of salt, .7 of 1 per cent, is frequently used, either directly into the veins or under the skin. Sterile salt, sterile water. Needle under skin of breast. Lift the bag up four feet or higher; solution forms a tumor. Now push the needle in another direction. May put in twelve ounces to two pints in each side. Cover with adhesive plaster. In fifteen minutes over one-half is absorbed, in three hours nothing is left. Very good method in that it can be used before undertaking an operation that will necessarily cause the loss of some blood. In desperate cases, where great haste is necessary, put the solution directly into the median basilic vein.

ECLAMPSIA.

A woman during labor can have convulsions, due to epilepsy, hysteria, meningitis, tumor, apoplexy, acute anemia. Epilepsy is not common, pregnancy seeming to exert a favorable influence on the disease. An epilepsy of pregnancy has been described. Said that there exists a relation between eclampsia and epilepsy. Feré says they are similar, and cases are on record where eclampsia was followed by real epilepsy.

Hysteria is also quite rare during pregnancy, but there is great likelihood that the attacks will become worse after labor. The other accidents are quite rare, but this does not throw them out of consideration.

A woman that has convulsions in the latter part of pregnancy or labor or puerperium, in ninety-nine cases out of a hundred, has eclampsia. The convulsion resembles an epileptic convulsion, but recurs very soon. The stupor after each convulsion becomes longer as the number of attacks increases, till there is more or less deep coma between the attacks. This is the usual picture of eclampsia and there is almost always no difficulty about the diagnosis, but this should not make one careless.

Eclampsia means to "burst out," to "shine out," and refers to the fact that the disease suddenly appears in all its violence, without warning. Close observation of pregnancy cases will usually discover sufficient warning.

Causation—The disease, in round numbers, occurs 1:500 cases, but this varies much. Seen much more frequently in primiparae than in multiparae. It occurs most often during labor itself, then during puerperium, and least often in pregnancy. Occurs in last three months, but cases (fatal, too) are on record of eclampsia in the 3rd, 4th and 5th months. Schroeder, 316 cases, 190 cases in labor, 64 cases in the puerperium, 62 cases in pregnancy. Twin pregnancy gives a special disposition to eclampsia. It is also more frequent in cases of contracted pelvis. The cases are more frequent in damp, cold weather; therefore, in the fall or in March. Heredity is said to have some influence. Elliott reports a case where the mother and four daughters died of eclampsia. The real cause of the disease is still unknown. Until very recently the theory that it was due to an inflammation of the kidneys, and, therefore, uremia, was very generally accepted. Now there is doubt about this. In 1867 Carl Braun claimed that every case of eclampsia was due to acute renal insufficiency, and that this was the result of some organic or functional disease of the kidney. There is a great deal of evidence in favor of this view, so that it has kept its place till recently. The occurrence of albuminuria, casts, renal epithelium, pointed to nephritis. Still, Ingerslev reports 106 cases of eclampsia where no albumen or casts were in the urine, and where post-mortem no pathological changes in the kidney were present. Value of these observations is doubtful. Other theories are that of Halbertsma, compression of the ureters; that of Traube, anemia and hydremia cause edema of the brain. That it is due to ammonium carbonate in the blood; acetonemai; carbamic acid.

In eclampsia there is high arterial tension, shown by the pulse and the sphygmomanometer. This high arterial tension is due to increase of the amount of the blood and spasm of the vaso-constrictors. There is a great increase in the amount of fibrin in the blood, which explains some of the difficulties of venesection. Infant has same condition. The urine (contrary to Bouchard) has been found equally toxic to animals, in the pregnant, non-pregnant and eclamptic condition when of the same specific gravity. The blood serum is the same for all.

Veit's theory, deportation and solution of syncitium, and lack of anti-bodies.

Generally Accepted Theory of Eclampsia—The theory that is generally accepted now is that the eclampsia is a symptom of some sort of poisoning of the blood—*a toxemia*—there are present in the

blood, organic poisons, either results of bacterial activity or the result of some anomaly in the metabolism of the mother or of the fetus. What these poisons are has not been settled. By some it is claimed that the poison is a toxine absorbed from the intestinal tract. Others, that it is a toxine, the result of germ growth in the blood, claiming to have found a characteristic microbe, i. e., that eclampsia is an infection. Others, that the poison comes from the mother herself. Again, from the fetus, and especially the placenta. (See chapter, Toxemia.) In support of the last view, are the facts, that the eclampsia generally ceases when the ovum is removed, also when the fetus dies; further, that the tendency to eclampsia increases as the fetus grows larger. The theory of poisons circulating in the blood is supported by many points: (1) The pathological conditions found post-mortem—cloudy swellings, changes in the kidneys, and especially the liver. (2) The toxicity of the urine decreases during the attacks, while that of the blood is much increased (Bouchard). The attacks are, therefore, due to an acute increase in the amount of the poisons. (3) The symptoms are those of an intoxication, gastric, cerebral symptoms, sudden onset, and the frequency of nervous disorders following—amaurosis, anomalies of hearing and taste, which are analogous to the neuroses after typhoid and diphtheria. Still, while accepting this theory, we must recognize its incompleteness and take Schroeder's advice, not to consider anything as definite, but to be ready to accept the truth when it becomes known. The frequency of eclampsia in cases of nephritis is due to the impairment of the eliminatory function of the kidneys. In those cases where eclampsia occurs after a long, hard labor, it may be due to the accumulation of poisons, the result of great muscular effort.

Cause of Convulsions—What is the cause of the convulsion? Several adjuvant factors elicit the convulsion. A rough palpation, a jar to the bed, a hypodermatic injection, an enema, an examination or operation, pressure of the head on perineum, a bright light, loud talking. The real cause of the convulsion is generally supposed to be a spasm of the vessels of the brain analogous to that of epilepsy. There is some difference of opinion on this point, but the theory has much in its favor: (1) The rapidity of its occurrence and disappearance. (2) The absence of findings post-mortem in the brain. (3) The good effects of vaso-dilator treatment. (4) Experimentally, acute cerebral anemia will cause convulsions.

During pregnancy there is a gradual increase in the excitability of the nervous system, like children. There is an accumulation of excrementitious matters in the blood. These poisons irritate the vaso-motor centers, or the vessel centers and motor centers at the same time. If the vessels of the cerebral hemispheres are involved

we get coma, if the pons and medulla, convulsions. The convulsions, then, given the increased irritability due to pregnancy and the added poison, can be easily elicited by one of the external irritants mentioned.

Thus defined, we may say that in all probability eclampsia is due to poisoning of the blood from unknown source, which, owing to a hyperexcitability of the nervous system and some impairment of the function of the liver (as an elaborator of poisons), or of the kidneys (as eliminators of poisons), causes a spasm of the blood vessels of the brain by acting on the vaso-motor centers.

Pathological Anatomy—Changes are not so marked as one would expect in such a severe disease.

In the *liver*, there are usually small or large hemorrhages, not so much through the substance as under the capsule in the neighborhood of the suspensory ligament. The hemorrhages in the liver substance are not simple, but are due to necrosis, with typical location around the branches of the portal vein. Focal necroses. The condition is called acute—peri-hepatitis hemorrhagica. The liver itself is yellowish mottled, shows a fatty degeneration and anemic necrosis, especially around the periphery of the lobules. The process may be so advanced as to resemble a case of acute yellow atrophy of the liver.

The kidneys almost always present some signs of disturbance. In 289 cases observed, from 1892 to 1900, in the Berlin Charité, there were symptoms referable to the kidneys in all, and these changes were found in all that went to autopsy. Schmorl (C. f. G., 1901), in 73 cases, found one with normal kidneys. A very severe congestion in some cases, often the signs of a more or less acute nephritis. Cloudy swellings, and fatty degeneration of the epithelium. Thrombosis of the glomeruli and smaller veins and arteries (Schmorl). Or the kidney of pregnancy, with an acute inflammation. This is hard to distinguish from acute parenchymatous nephritis. Further, we find in all forms of chronic Bright's disease.

Lungs—Almost always congestion and edema, very often hemorrhages, which are usually under the pleurae. Broncho-pneumonia is not rarely found, due to admission of food particles, blood, slime, etc., into the air passages. Gangrene of the lung, sometimes, is the cause of death. Small arterial and venous thrombosis. Emboli of liver cells, of decidual cells, and cells that look like hypertrophied nuclei of lymphoid cells of the bone marrow, syncitium. These are not characteristic, occurring in other conditions.

Heart—Usually contracted, auricles full of a dark, purplish blood which does not clot readily. Heart muscle fatty, tears easily. This is a fatty degeneration of the heart, which is often the cause of death. Said (and quite plausibly) that the continued administration

of chloroform predisposes to fatty heart. There may be sub-pericardial hemorrhages. The amount of fibrin in the blood is much increased. The blood is thickened.

Brain—The changes found here are the least marked. Flattening and moderate edema of the convolutions, sometimes a little increase in the cerebro-spinal fluid. Rarely a severe congestion, more often the signs of anemia-cerebri. Sometimes there are hemorrhages, which may be small or large, and may occur in the ventricles. The infrequency of hemorrhage has been emphasized, but Zweifel, of Leipsic, says apoplexy is common, and that, "All theory notwithstanding, these show that there is great cerebral congestion, so great that even the elastic arteries of young people are ruptured." Schmorl, l. c., says, in 65 autopsies, he found 58 cases of hemorrhage, either small ones or large, or areas of cerebral softening, often together with thrombosis. In unusual cases other causes of the convulsions can be found in the brain, e. g., tubercle, tumor, etc. These changes are occasionally found also in the children of eclamptic mothers (Bar).

Clinical Course—The eclamptic attack may occur suddenly without warning, but often there are premonitory symptoms. If the case was one of albuminuria during pregnancy, of course you will be on the lookout for symptoms, and if at all careful will not be caught unawares.

Premonitory Symptoms—These are headache, nausea, vomiting, disturbances of vision (often due to a retinitis gravidarum), twitchings in the muscles of the calf, of the hands, dizziness, stomachache. The patient may complain of other disturbances of the special senses, of spots before the eyes, ringing in the ears, even deafness; disturbances of taste and smell. These are present 1 to 24 hours before the outbreak and serve to draw attention to the condition of the patient. These warnings should be heeded. Rarely, the convulsions come on suddenly. Wherever the patient may be she falls to the ground unconscious. The pupils dilate, the eyes are turned, the head also, to one side; the patient opens her mouth, then the jaw is pulled to one side. There may be a cry or a sigh. The whole body becomes rigid. The features are horribly distorted, the arms flexed, hands clinched, the feet inverted, the toes flexed. The patient may be drawn slightly to one side. This condition lasts for a few seconds, then the jaws open and close violently, the eyelids also, spasm begins in the face, then usually one arm, then the head, and now the whole body. This is a violent clonic convulsion, which may throw the patient out of the bed against any object. Severe injuries can result, as fractures; the tongue is protruded, the teeth may chop it up. Foam comes from the mouth, often tinged with blood. The respiration is completely stopped, the chest being rigid.

The pulse is high and strong, later it grows weaker, but is sometimes hard to feel because of the convulsion. The eyes are wide open, the face is swollen, the picture is horrible. The cyanosis is extreme, the lips are purple. The convulsive movements remit, a few twitches or jerks take place, the patient lies quiet, the heart thumps violently against the chest wall. A few seconds the patient appears to be dying, there is a long sigh, and the respiration becomes stertorous. Gradually the respirations quiet down and the woman lies in coma. In the favorable cases she wakes up after a short time, bewildered, severely sore in the muscles. After a few minutes to an hour, another fit occurs, or she may have no more. With the recurring convulsions, intervals become shorter, the patient lies in deep coma all the time. Fever now begins, the pulse goes up. The fits may occur every five minutes, but usually the time is twenty minutes. They may show some regularity of recurrence. She may have as many as 60 a day. Cases are on record of 80 and 90 convulsions. These cases almost invariably die. Labor usually begins if the convulsions are at all severe, and labor is usually rapid if the pains have once begun. The convulsion lasts from 30 seconds to two minutes, very rarely any longer, and these are bad cases. After labor the convulsions usually cease or become infrequent. The patient lies in coma from six hours to a week (rare), finally awakes with no recollection at all of what has happened; may even be surprised and deny her own child, when it is presented to her.

When the case takes a fatal course the attacks increase in number and become more violent. The temperature goes up, usually to 103, sometimes to 105, or down; the pulse goes up, becomes weak and running. Signs of edema of the lungs appear, rattling, cyanosis, even between the convulsions, or death may take place at the height of a convulsion from apoplexy or heart paralysis.

Sometimes the woman is successfully delivered, but the pulse does not improve, the coma deepens, and edema pulmonum carries off the patient. Some cases are bad from the start. The patient may die after one or two convulsions in a few hours. Further, some cases have convulsions for one or two days, and then recover. Sometimes there are no fits, patient falls at once into coma. As a rule, the case ends one way or the other inside of three days. Examination of the urine shows it very albuminous and full of casts.

Prognosis—Always very guarded; even in the apparently lighter cases, death sometimes takes place. Hemorrhages into the brain, edema pulmonum, edema laryngis, and asphyxia, during the attack. Exhaustion, heart failure, embolism, thrombosis of pulmonary artery, toxemia. Later, she may die of sepsis, which is quite common after eclampsia. Sometimes the severer cases recover, so assert neither way, but explain the gravity of the case and have counsel

always. Further, the patient is endangered by the severe operations which are necessary to deliver her. Tears of the cervix have not seldom been the cause of death by anemia or sepsis. The per cent. of deaths is about 25. This has not been influenced as much by the treatment in the last few years as one would like. Different authors give from 7% to 35%. But the cases vary so much that unless more than 100 are used as a basis, conclusions as to this or that method of treatment are absolutely of no good.

For the child, the prognosis is bad. Over 50% die, either during the labor, or in the first few days after it. The baby dies of asphyxia, or of the same poison from which the mother is suffering; it may even have eclampsia if born alive. May die of morphine poisoning. In some cases cranioclasis is performed in order to deliver rapidly.

Diagnosis—This is usually not difficult. The severity of the case is usually sufficient. When you are not present during the convulsion, but find the patient in more or less deep coma, the description given by a neighbor is useful. The attack resembles in all respects an epileptic convulsion, but is distinguished from this by the repetition and the prolonged coma. From apoplexy by the same sign and a prolonged local paralysis. This is absent in eclampsia, unless complicated by hemorrhage.

It is impossible to distinguish repeated fits due to brain tumor. Treat the case as eclampsia. Hysteria will never give any trouble. The evident intention in the movements, the fact that the patient does not hurt herself; the ludicrous positions assumed, which are plainly hysterical, and the absence of a type of the movements, i. e., tonic and clonic, serve to make a diagnosis plain.

Consciousness is not lost. Further, there is no albuminuria, there is no fever, there is no rapid pulse. The history of the patient, her character. Then there are often hysterical paralyses, anesthesia, which may be general, restriction of the visual field.

Important is the diagnosis of the severity of the case. Here the pulse gives the most important information. If the pulse remains full, hard, below 120, there is no immediate danger. If above 120, soft, weak, compressible, or even running, the prognosis is very bad, almost always there is a fatal termination.

High fever is not as bad a symptom as a very subnormal temperature. Above 103.5° is bad. Symptoms of edema of the lungs, e. g., bloody froth from the mouth and nose, rattling in the chest are bad. Cyanosis between the attacks; many severe and long convulsions are bad; if the convulsions persist after the uterus is emptied, bad; but if milder than before, and the pulse is good, not a fatal sign.

Treatment—Prophylaxis is of great importance. Careful exami-

nation of the urine in every case of pregnancy, at least every three weeks, preferably every week and, in suspicious cases, every day. A general examination of the patient is also desirable, to see if there is any change in the heart, liver, etc. A careful watchfulness for symptoms of toxemia is just as important. Treatment of albuminuria during pregnancy must always be instituted, even though all cases of albuminuria do not develop eclampsia. A carefully observed milk diet. Systematic employment of the hot bath. Careful attention to the bowels; in short, the treatment prescribed for nephritis during pregnancy. If after ten days the edema increases or does not improve, the headache, nausea and vomiting, disturbances of sight, etc., arise betokening involvement of the brain, it is justifiable to terminate the pregnancy.

Labor Induced Thus—Chloroform. Preparation of the patient. Dilate cervix, if not already dilated, to admit Barnes' bag. Puncture bag of waters, insert bag, fill it and put patient to bed. Give two pints of saline solution hypodermically, if the patient takes no fluids. If tendency to convulsions give chloral. As soon as delivery possible, forceps if necessary. See that the uterus is empty, that no clots form in its cavity. These cause after-pains, which may tend to prolong the convulsive state.

After Delivery—O iv Saline Sol. in the colon, epsom salts by mouth, also chloral gr. xxv; and gr. ¼ morphine hypodermically. These should be given before patient awakes from the anesthetic. Catheterize also. After this not to be disturbed.

Any operation undertaken while eclampsia is threatening must be done in anesthesia. After an attack has occurred, the case requires the constant attendance of the physician.

AFTER THE CONVULSIONS HAVE OCCURRED.

After the Convulsions Have Occurred—

(1) Put her to bed with numerous pillows to protect her from the vehemence of the attack, which sometimes becomes frightful. Wrap a clothes-pin in a thin handkerchief and place it between the teeth (hang it over the bed when not in use). Keep the room darkened, head against the light and patient should be lightly covered. No visitors, no loud talking. BLADDER EMPTY. Do not disturb the patient except for treatment.

(2) *Narcotize the Woman.* As a rule, do not use chloroform; only where the convulsions have been recurring too rapidly, e. g., every five minutes, or where there is extreme jactitation. May be used but not kept up for hours, as is sometimes done. It is a cause of fatty degeneration of the heart muscle and liver, and some of the deaths must be ascribed to the chloroform, not to the eclamp-

sia. Give the patient ¼ gr. of morphine hypodermically, repeat in 30 minutes, if there is another convulsion. Do this even if the patient is comatose. Repeat again in 30 minutes if there is another fit, or if the patient is restless. Give 30 grains of chloral per rectum in milk. Repeat this in two hours.

Now what to do? If the patient has labor pains, rupture the bag of waters. If labor has not begun, the question is hard to decide. Majority of authors are opposed to the induction of labor (premature) when the eclampsia occurs during pregnancy. All advise induction of premature labor when the eclampsia is threatening; therefore, why not when it has broken out? Still, the question is almost always settled by nature herself, for very soon after the beginning of the convulsions labor pains begin and labor is soon terminated. Watch the uterus carefully, and if you see that there are pains, rupture the bag of waters. If the attacks continue in spite of narcotics, must also terminate pregnancy.

The question of bleeding has been discussed very much. Formerly the custom was to bleed, in every case. Soon after chloroform was used in obstetrics, it supplanted bleeding almost entirely. In fact, bleeding was called a barbarous, ancient and useless procedure. It had its advocates, however, in the country practitioner. Now one voice after another is being raised in behalf of venesection, and it bids fair to occupy an honored place in the treatment of eclampsia again. It is very advantageously combined with the infusion of saline solution—so-called washing the blood—recommended by the writer in 1895.

Indications for Bleeding—

(1) Signs of pulmonary edema, cyanosis, rattling in the lungs, bloody foam in the throat.

(2) Repeated convulsions which seem not to be affected by the narcotics.

(3) Great cyanosis, together with severity of the convulsions. In full-blooded patients with a high, full pulse, bleeding does good. But if the pulse is small and running, no one advises bleeding. Indeed, these cases very rarely recover under any treatment.

(3) *Obstetrical Treatment*—The majority of cases of eclampsia recover when the uterus is emptied. Still not all, and eclampsia occurs even during the puerperium. Why this is has not been settled. Some say that the removal of the child removes a source of the poisons which cause eclampsia. It is said that after the child dies eclampsia ceases. True in a certain number of cases, but eclampsia has occurred when the fetus was dead and macerated. Others say that the fetus forms an irritant and when this is removed, the convulsions cease. Third theory is, that the removal of the ovum relieves the pressure on the kidneys, etc. Dührssen advises immediate delivery in all cases, incising the cervix, the vagina and peri-

neum, if necessary. The majority of authors condemn this, but a very large number concur in hastening the delivery as much as possible,—as much as is consistent with the safety of the mother.

Early in the first stage, puncture the bag of waters. In about one-third of the cases convulsions will cease or be very much less severe, and infrequent. Usually labor progresses very rapidly. Pains strong and often. If the convulsions are frequent and the coma deep and labor progresses slowly, under anaesthetic (chloroform), dilate the cervix with the fingers (Barnes' bags, if it is not yet effaced), and deliver the head with forceps. If the child is dead, as is not seldom the case, use the cranioclast. Vaginal Caesarean Section is proposed. All operations in anesthesia. Bossi's dilator is dangerous. Caesarean Section has also been suggested.

It is seldom necessary to make cervical incisions in order to hasten delivery. In the severe cases, where the convulsions are frequent, the coma profound, and the pulse going up, these may be necessary. Let the woman bleed freely, but be certain that no clots are left in the uterus. This may be accomplished by tamponing the uterus, and removing the gauze after one or two hours. Writer believes that delivery should be completed as soon as possible after first attack.

(4) *Elimination*—Aid in the elimination of excrementitious matters, or poisons, from the blood. Bleeding, to a certain extent, accomplishes this. The methods to be given here are more applicable to cases occurring during pregnancy and in the puerperium.

(a) By the skin. Hot water packs: Not the baths, because it involves too much disturbing the patient. If there are fits the baths are very troublesome.

(b) By the bowels: Not useful during the labor. Do not use croton oil if avoidable, but give two ounces of castor oil by the rectum. Later, free exhibition of salts. Not rarely the cathartics will not act. The bowel seems paretic. Tympany develops. As early as possible in a case give a large dose of salts, with a vegetable cathartic, as jalap. This before she has gotten comatose. Use stomach tube.

(c) Diuretics of little value, still certain authors are much pleased with the free administration of lemonade, with the stomach tube if the patient is soporose. A method that recently came into vogue is sub-dermal or intravenous injection of saline solution. Dilutes the blood, favors diuresis and diaphoresis. Combined with venesection is good, and salt solution should be injected into the bowel.

In the puerperium, same treatment, but, of course, no obstetric narcosis. Eliminatives, liquid diet, especially if disease prolonged.

There are several other methods of treatment, of which the use of veratrum viride is first. This is called the American remedy, and is useful as an adjuvant, but is not to be relied upon alone. Given in 5 drops to the dose hypodermically of Norwood's tincture, every 30 minutes, till the pulse is brought to 60 beats per minute, it is said to control the convulsions.

Oxygen is useful to combat cyanosis and to support the heart while the patient is in the profound coma that follows the attack. It also lessens the danger of edema pulmonum.

Regarding laceration of the perineum. If operative delivery, repair perineum. If no operation, but convulsions after delivery, wait for two weeks. Condition of patient to guide.

The patient may need stimulation, and then camphorated oil, aromatic spirits of ammonia and, rarely, ether may be used.

The cases should be watched carefully and constantly, not being left alone an instant, and the indications for treatment promptly followed. These may vary every hour, and, therefore, the accoucheur must stay at the bedside till all danger is past. Success in the treatment of these formidable accidents depends on interpreting the condition of the cases.

RUPTURA UTERI.

This serious accident occurs 1:2,000 cases. Not possible to get statistics because a large number of cases are not diagnosed. From the number found at post-mortem, one is led to believe there are more than are recognized. To understand how it occurs we must refer to the normal mechanism of labor.

Dilatation of the lower uterine segment and cervix, fibres drawn up into the body of the uterus. Now external os dilates. Fundus retracts over the child, the lower uterine segment and vagina form one long, thin, continuous tube. Too great retraction of the fundus over the child is prevented by the round ligaments which anchor the uterus to the pelvis and by the tension of the abdominal walls. Thus the uterus is pressed down with the child, the latter is forced into the pelvis. Should the presenting part not get into the pelvis, because of contraction of the inlet, and the pains be strong, the uterus will draw up higher, the lower uterine segment and cervix will get thinner, till finally the whole child will lie in the lower uterine segment and the stretched vagina. The round ligaments, under these circumstances, are excessively tense and painful and insert high up on the uterine body. The thickness of the lower uterine segment now may be that of blotting paper, the fibres are separated, and a rupture is imminent. The same conditions occur when the shoulder presents and the condition is called "Neglected transverse presentation."

The individual tendency to rupture, or rather to this dangerous thinning of the cervix and lower uterine segment, varies much, but as a general rule multiparae are more subject than primiparae. Old patients more commonly than younger ones. Women with loose abdominal walls more than those with tight walls. Fat women more often than thin women. If this state is not quickly relieved the thinnest spot may give way and all or part of the child escape into the abdominal cavity. This usually occurs at the height of a pain but may occur when the patient turns in bed, or coughs, or by some rough palpation of the lower abdomen, pre-eminently, by some attempt at internal version. The part that gives way is that part which suffered the greatest dilatation. In cephalic presentations that side on which the occiput lies.

The rupture may be incomplete, when the fibres of the uterus tear, but not the peritoneum; or complete when everything tears into the peritoneal cavity. Important difference.

Causes.

A. All mechanical factors that can prevent the engagement or further progress of the child can cause uterine rupture; such are:

(1) Contracted pelvis, or any obstruction, e. g., exostoses.
(2) Transverse presentation—common cause. Pelvis normal or pathological.
(3) Malpositions of the head, e. g., mento-posterior positions. Anterior and posterior parietal bone positions, etc.
(4) Hydrocephalus.
(5) Obstructions of the soft parts, e. g., atresia of the cervix or vagina, tumor, etc.

B. Rupture sometimes the result of operative procedures—forceps, version, craniotomy, etc.

C. Causes which produce a weakening of the uterine wall, e. g., syphilis, tuberculosis, fatty degeneration, sepsis, previous rupture of scar of Caesarean section, pressure necrosis.

The tear is almost always in the lower uterine segment. It is usually oblique, but may be parallel with the long axis of the uterus, in which case it may extend above the contraction ring toward the fundus. Or the uterus may tear off at its vaginal attachment. The tear has jagged and bruised edges which are thin. The tear may be anterior or posterior or at the side, depending where the greatest stretching was. It may open the bladder, the broad ligaments. A large hematoma may form under the peritoneum, which later may rupture into the peritoneal cavity, or burrow up under the kidneys or elsewhere. Amount of bleeding varies. Rupture almost always takes place long after the bag of waters have ruptured, but some-

times (rare) it occurs before. Rupture may take place at the beginning of labor, again it occurs only after long and hard labor.

Symptoms—The beginning of dangerous stretching of the lower uterine segment can almost always be determined if the accoucheur is on the alert. The probabilities that it will occur in a given case will aid in the diagnosis. Given a case where you know that there is some obstruction to the advance of the child, you must look out for rupture of the uterus. Still only too often the condition is diagnosed after rupture, or when peritonitis has developed, or at the post mortem.

The patient is restless, anxious, from long labor, complains of pain all the time, has no rest between pains but moans continually. At the height of a pain or when the patient changes her position she experiences a sudden tearing in the abdomen; she says something has burst inside her. Still again the tear may be slow and gradual and the condition may be recognized after the symptoms of shock have developed. After this the aspect of the case changes. The pains immediately cease or become weak, and some hemorrhage appears. These are two important signs. The point of rupture becomes more tender, now symptoms of collapse appear, fast, quick, small pulse, pale, cold sweat, fainting, impressions of impending dissolution, dyspnea. Or the symptoms may be those of internal hemorrhage, in which they take several hours to develop and are similar to those from rupture of an extra-uterine pregnancy; or the symptoms may be slight and later a septic peritonitis develops, or the patient discharges peritoneal fluid, the diagnosis is made. Fortunately these sub-acute cases are rare.

Signs—

I. *Threatened Rupture.*
   a. Notice restless, anxious patient; face pale, rapid, high pulse; may be a little temperature.
   b. Strong pains and no advancement of presenting part.
   c. Uterus hard and drawn up over the child, which lies in the dilated lower uterine segment. Fundus hard, lower uterine segment soft and balloons out during a pain. Can see the contraction ring which usually runs from the right above, left below. Differentiate the bladder and gas, which is rare—catheter, percussion.
   d. Round ligaments tight, hard, wiry and very tender, especially on the side which the rupture threatens. They insert high on the uterus.
   e. General tenderness over the uterus, but especially over the lower uterine segment.

II. *Actual Rupture.*
   a. Notice collapsed patient. Notice none or weak pains.

b. Hemorrhage externally—mild, severe, rarely none.
c. Cannot feel presenting part through vagina. It has gone or it has become freely movable.
d. May feel the tear, or feel intestines which have prolapsed through the rent.
e. If the child is in the abdominal cavity, feel a small hard lump which is the uterus, on one side, and the child on the other, or if partly extruded, feel two tumors.
f. When the tear is sub-peritoneal may feel emphysema. If there is decomposition, always fatal.

Diagnosis—Generally not difficult, when possibility of a tear is recognized and the above symptoms are considered. Attention to the previous symptoms settles diagnosis.

Prognosis—Very grave. Formerly was 95% for mother and 99% for child. Dangers are sepsis and hemorrhage—external, internal. Better now since antisepsis is practiced. Article by Cholmogaroff gives the mortality running from 21½% to 65%, depending on no particular line of treatment. Since the fetal mortality is nearly 100% we pay no attention to the child, but do everything to save the mother.

Treatment—Of course prevention plays the most important role. Watch your cases carefully, if there is no progress in the labor in spite of good pains. If you diagnose threatened ruptura uteri, the indication is to empty the uterus as quickly as possible, and further, this must be done with the least possible increase of intra-uterine tension. Forceps in head presentation, if the conditions are present. If not, cranioclasis. It is foolhardy to attempt a version in threatened uterine rupture. The child in these cases is almost always dead and the gain is therefore nothing for the immense risk. I would advise in cases where the child is surely dead, to do cranioclasis as a primary operation. Extraction in breech presentation. Perforation of the head in hydrocephalus. Embryotomy in transverse presentation. Do not attempt version here, the child is usually dead. Danger for the mother is too great. Caesarean section in absolutely contracted pelvis or where the soft parts are too narrow and hard. Symphysiotomy does not come up in the treatment of threatened rupture of the uterus, unless fetus alive.

After rupture has occurred—six methods:

(1) Expectancy, i. e., extract fetus, replace intestines, give ergot, morphine, ice bag on abdomen. Some cases get well.
(2) Drainage through rupture and the vagina, after delivery by the natural passages. Ergot, ice bag, morphine.
(3) Sew up the tear from below and drain part of the tear

with gauze; after delivery of the child through the natural passages.

(4) Delivery from below, and vaginal extirpation of uterus.

(5) Laparotomy. Sew up rent, after removal of the fetus and placenta, cleanse cavity.

(6) Laparotomy with amputation of the uterus, or total extirpation, with or without drainage.

The method giving the best results is: (1) Delivery of the child per vias naturales, also placenta. (2) Careful asepsis. (3) Force uterus down, vulsella in each lip, and (4) Sew the tear with catgut, using long-handled needles. (5) Leave a roll of iodoform gauze in the lower angle of the wound, the one end in the peritoneum, the other in the vagina. (6) Fill vagina one-half full with gauze. Rest, morphine, ice bag, ergot.

The first four methods mean that the delivery of the child through the vagina is possible. Sometimes it is not. In these cases you must do a laparotomy, remove the child; then deal with the uterus according to conditions. If the woman is septic, amputate; if clean, sew up the tear; if tear too low for amputation, extirpate uterus, sewing vagina together, or draining through vagina.

In incomplete tears, where just the peritoneum is left, clean out carefully and pack lightly with gauze. *Careful not to tear* through the peritoneal wall into free cavity.

There still is much to learn about the treatment of ruptured uterus and it will vary with the environment of the patient. If she is at home the treatment proposed is the best; if she is in a hospital, perhaps laparotomy would give best results. If septic, operations from below, even to extirpation of the uterus, are best; if not infected her chances are good with either course of procedure, but the abdominal method gives more control over the hemorrhage.

A very important question is that of removal to a hospital. In no case of threatened rupture may this be done, as the uterus may tear from the jolting. The patient must be delivered where she is, even if the facilities are poor. They must be improved.

After rupture has occurred there is the same objection, but not in such force. The treatment of the case per vaginam, therefore, will be preferred, wherever it is at all possible.

COMPLICATIONS ON THE PART OF THE INFANT.

Asphyxia Neonatorum.

Asphyxia means "pulseless," but is applied to the child as to the adult, to express loss of life by the interference with the respiratory function. Danger to the life of the fetus in utero means danger of asphyxia in utero. The death of the fetus is almost always caused

by cutting off its supply of oxygen. There are other causes, but these are very few (e. g., syphilis).

The fetus' blood becomes more venous as the end of pregnancy draws near. This is due to the gradual narrowing of the ductus Botalli and ductus Arantii. The fetus, therefore, cannot stand a sudden increase of the venosity as well toward the end as earlier in pregnancy. This is in accord with clinical experience. Children of the seventh month stand asphyxia better than at the ninth month. This may perhaps explain a popular notion that seventh month infants are more likely to live than those at eight months. It is not the increase of the CO_2 in the blood which causes asphyxia, but the lack of O. The medulla becomes irritated by this lack of O, and a respiratory effort is made. It is the same mechanism that occurs when the child is born. The separation of the placenta causes such an interference with the circulation that no more O is in the fetal blood, this so irritates the center in the medulla that a respiratory effort is caused. If the child is still in utero when the attempt to inspire is made, the material near the child's mouth is sucked in, be it blood, meconium or liquor amnii. This first inspiration dilates the capillaries of the lungs, and, unless there is something in the alveoli (e. g., air) to exert counter pressure, the capillaries may burst. We therefore find in fetuses that have died from intra-uterine asphyxia, ecchymoses of the lungs and especially under the pleurae. If the acting cause of the asphyxia is a slow one, the respiratory center may be benumbed and the fetus may die without having made any attempt at respiration. These cases offer a bad prognosis, even if the child be delivered still alive.

Causes—(1) Maternal—(a) Disturbances of the utero-placental circulation, the result of pathological labor pains, e. g., in the stage of expulsion, long and continued pains. (b) Tetanus uteri (ergot). (c) Neglected transverse presentation. (d) Death or severe anemia, or asphyxia of the mother. The child dies first, it having been proved that the O in its blood is absorbed and used by the mother.

(2) Fetal Causes—(a) Separation of the placenta, e. g., after part of the body is extruded (in breech presentation), also premature detachment of the placenta. (b) Compression of the cord, or prolapse of the cord, or around the neck, breech presentation, placenta compressed. (c) Compression of the brain—forceps, hemorrhage, fracture, or compression from contracted pelvis. Death in the last case is due to, first, irritation of the vagus, therefore slowing heart, then paralysis of the vagus and the very rapid heart.

Symptoms—(1) In utero.

(1) Increase of the fetal movements—then they grow feebler.

(2) Heart tones grow progressively slower, then suddenly

become uncountable. If they go below 100, suspicious, certainly if to 80. During pains go to 100, between pains 120. Then as case gets worse, during the pain to 90, between pains 110 to 120, then to 80, or they may go to 160 between pains. The irregularity of the tones also is important and the quality of the tones; the first sound may have lost its booming quality and become more valvular and like the second sound. (Only useful to acute observer.)

(3) Passage of liquor amnii stained with fresh meconium; not thoroughly mixed with the fluid because this may be old. Sign of use in the second stage, or when the head is high up. Of no significance when have breech presentation, unless the breech is high up. The cause of the passage of meconium is an active peristalsis due to the asphyxia. It is common in asphyxiated persons to find that there is a passage from the bowels. It is not paralysis of the sphincter ani. In some normal cases the meconium is found following the child. This due to the temporary asphyxia during the period of expulsion. Examination of a perfectly normal case as the head passes the vulva may show the heart tones 80. It is a fact that quinine administered to the mother may cause the passage of meconium. The sign is not pathognomonic, as will be seen.

(4) May feel, see and hear the inspiratory movements made by the child.

(5) In breech cases can see the diaphragm move and can feel that the anus has lost its tonus, if fetus is dead. Time between the first respiration and the death of the fetus not definitely known. Varies from 3 to 15 minutes. It takes longer to drown (and this is drowning) a baby that has not breathed than one that has.

Symptoms After Child Is Born—These, of course, depend upon the degree of the asphyxia, whether mild or severe. In the milder degrees the child is born, dark blue, sometimes purplish, the face is swollen, the conjunctiva injected, the eyes somewhat prominent, the skin may be a little pale around the nose and mouth, but the lips are deep blue. There is reaction in the muscles and they have not lost their tonus or may even be contracted. The mouth closes if you put the finger in the throat. The heart beat is slow but strong, and the cord is congested, a very few respirations at long intervals accompanied by a gurgling sound, the mouth and the trachea being full of mucus. If the face be sprinkled with cold water the muscles react and this is the sign of a mild asphyxia. If the child reacts to

stimuli the asphyxia is mild and the child will almost always recover. The condition is called *Asphyxia Livida.*

Severe Cases—The severe cases present an entirely different aspect. The child is pale, waxy, but the lips alone are blue. The body is limp, the extremities hanging down without any tonus at all, the jaw hangs relaxed, the throat does not react. There are no respiratory movements, or a very rare gasp which is very superficial and may be simply a movement of the jaw. The only evidence of life is very weak and slow, or perhaps very rapid, heart beat. This may not be palpable, but audible to the stethoscope. The cord is limp, collapsed, the baby looks like a corpse. The criteria of this severer form of asphyxia are the absence of muscular tonus and the loss of reflex excitability. This condition is called *Asphyxia Pallida* and is of much worse prognosis.

Diagnosis—Not all children that are born in an apparently moribund condition are asphyxiated. Other conditions are pressure on the brain, anemia, and apnea, morphine poisoning. Brain compressions may be both the cause and the result of asphyxia. We have seen how it can cause asphyxia. In cases of asphyxia there is great cerebral congestion and the thin walled vessels of the brain sometimes burst and there is meningeal hemorrhage.

The diagnosis of cerebral compression is very hard and the character of the labor must be the guide. A hard forceps, or extraction, in which it is known that injuries to the skull have been made; examination of the skull may show a fracture or a dislocation of the plate of the occipital bone on the condyles. Usually you have to treat the cases as asphyxia. The post mortem clears the diagnosis.

The diagnosis of anemia can only come from a study of the labor because an anemic fetus looks like asphyxia pallida. Rupture of a vessel from a velamentous insertion of the cord. Tearing of the placenta in placenta previa, cutting it in Caesarean sections.

The diagnosis of apnea—in a few minutes the child breathes. The heart beat is strong and regular, the features gradually become blue, a few superficial respiratory movements, then a gasp, or a sneeze, which brings the mucus from the air passages, and finally a cry.

Morphine poisoning. Of course, very seldom and usually not considered. Child is revived, breathes, cries, opens eyes and then relapses into sleep; repeats the process when awakened.

The Prognosis—In the milder degrees of asphyxia is good if properly treated. Almost always get well, unless there is some other accident, e. g., cerebral hemorrhage. In asphyxia pallida the prognosis is not so good, but if no other cause than the asphyxia the majority get well if properly handled.

An interesting subject and one that is by no means cleared up,

is the relation of asphyxia to mental diseases in later life. Cases are on record where idiocy developed in the first years of life after asphyxia, or long labors, or severe forceps operations. The evidence is sufficient to make us strive to avoid all the causes of asphyxia, to bring the child back to life as quickly as possible and make the recovery positively sure.

Treatment—Important to distinguish between the milder and the severer forms of asphyxia. Up to a certain point the treatment is the same for both cases. When the child is still in utero the indication is for rapid delivery. We have no means of treating asphyxia in utero. If conditions for forceps—forceps; if a breech —extraction; version and extraction. In every labor where it is foreseen that the child is likely to be asphyxiated, preparations for the same must be made—a hot bath, and plenty of hot water. Bath thermometer. Bath 100° to 110°. Hot towels, a suitable table, one or two tracheal catheters or a balloon catheter. As soon as the child is born you must determine the severity of asphyxia. Wipe the mucus from its mouth and throat. If the throat reacts (you can feel it close on the finger) it is a mild asphyxia, if not it is severe.

In general there are three points in the treatment, after the child is born: (1) *Keep* up the *body temperature*. (2) *Remove foreign bodies* from the air passages. (3) *Start respiration*, or practice *artificial respiration*.

Methods—(1) As soon as the child is born, it is tied off, wrapped in hot towels. Keep it covered as much as possible in the subsequent manipulations. If possible, carry out part of the manipulations in the hot bath. This part not to be forgotten. (2) Remove foreign bodies in the air passages. If the asphyxia is mild it usually suffices to wipe the mucus from the throat, and to hold the child up by the legs, its head touching the table, and pat it gently upon the chest. If this is not sufficient, use the tracheal catheter. No. 14, French scale, is the proper size. Passed into the larynx. It is usually not necessary to go deeper than the vocal cords, but if the chest does not expand when the fetus inspires one may conclude that the bronchi are filled and then it is necessary to pass the catheter down to them. Suck out the fluids and re-insert if there appears to be more. If gently carried out there is no harm done. In the absence of a catheter use a towel. The balloon catheter is not very good. (3) Stimulate respiration. In the milder asphyxia all that is necessary after the clearing of the passages is to rub the child vigorously, or spank it, or put a few drops of cold water on its chest while it is in a hot bath. Almost always these simple methods succeed. The rubbing should be all over the body so as to prevent epidermis in one place from being rubbed off. Should the child present the condition of asphyxia pallida these methods do no good because

the respiratory center is not in a condition to receive stimuli. You must supply oxgen to it until the center has become active. There are numerous methods of artificial respiration:

(1) Sylvester's method (preferably in the hot bath).

(2) Byrd's—Fold child up like a book, 20 times to the minute.

(3) Hold the child up by the legs while you compress the chest symmetrically and rhythmically.

(4) Schultze swingings. Only after all the other methods have failed or where you see from the start that it is inadvisable to waste any time on less certain methods. This is at the same time the most dangerous and most certain method. Grasp the child with the head between the two wrists, the fingers spread over the back, the thumbs in front at either side of the chest, the index finger under the axilla to prevent the child from flying out of your grasp. Now lift above the head, gently, let the legs hang down—this is expiration. Now swing out and forward, letting the child come between the legs, not too strong. You must hear the air enter the chest. Repeat the maneuver slowly 6 to 8 times, put the baby in a hot bath and note the effect on the pulse and respiration; if none repeat the swingings. Dangers—rupture of the liver or spleen, hemorrhage into the suprarenal capsules, etc.

(5)*Catheter for Insufflation of Air*—This must be done very gently, with the force of the cheeks only and with the air that has not been drawn into the lungs. The balloon catheter has been used for this purpose, but there is greater danger of rupture of the alveoli. Pure oxygen should be used if obtainable.

How long to keep up the attempts at resuscitation? The rule is as long as the heart beats, but sometimes the heart will beat for hours, if there is enough O in the blood. If due to a cerebral hemorrhage, this is possible for hours. Question if trephining could not be resorted to in some cases. Spinal puncture.

Treatment of Asphyxia Neonatorum: Summary—Forceps extraction; version and extraction.

(1) Remove the child to air as quickly as possible.

(2) Keep up the body temperature—hot bath, keep covered, warm towels.

(3) Remove foreign bodies from bronchi—inversion of child, wipe pharynx, catheter.

(4) Stimulate respiration:

(A) In asphyxia livida (mild cases)—

1. Rub child vigorously.
2. Spank it.
3. Hot bath and few drops of cold water.

(B) In asphyxia pallida (severe cases)—

1. Sylvester's method.

2. Byrd's method.
3. Compression of the chest and inversion.
4. Schultze swingings.
5. Mouth to mouth insufflation (catheter).

As a routine practice in cases of asphyxia it is advisable to clear the passages with the catheter. Then place the infant in a hot bath and watch it a minute. If it gasps, or if there are tiny respirations, wait, keep the water hot; if the child grows worse, compress the chest for a few times; if no effect, Schultze swingings, and later blow air or oxygen into the chest with the catheter.

Laborde's tongue traction, dilation of sphincter ani, medication, will not save the child if the above methods prove unsuccessful. After recovery from the primary asphyxia the attendant must watch the child carefully. It sometimes develops a secondary asphyxia, due to atelectasis pulmonum, which is usually fatal. Treatment similar to above.

OPERATIVE OBSTETRICS.

During a labor the accoucheur's duty is usually one of watchful expectancy. He simply studies the course of nature, and observes when and where he may be of assistance. He is not to render any "assistance" unless there is something wrong in the course of the labor, or some danger threatens either mother or babe. Under such circumstances he must interfere. He makes up his mind, first, that he must do something; second, what he is to do; third, when he is to do it. These three questions require a close study of the indications and a delicate balancing of the conditions in each case. Having determined that there is an indication for interference, a few words about obstetric operating in general.

1. The indication must be clear and distinct. Never operate to save time, nor to satisfy the desire of another practitioner; never to quiet the clamor of the friends, or the patient, nor for glory. The last is especially true of the graver operations, e. g., Caesarean section, symphysiotomy.

2. Asepsis must be absolute. Even in poor quarters this can be attained, of course with considerable trouble, but the conscientious physician will not spare this. If a serious operation is indicated the patient should be taken to a hospital whenever possible. If there is not the time or there be no hospital nearby, one must try to approximate hospital conditions at home, which may be done to surprising degree with a little work and a will.

3. The selection of the operation will depend on the indications, but sometimes it will hang on your skill, e. g., it may come to decide between craniotomy and Caesarean section. A skilled hand may prefer the section when the conditions for both are about evenly

balanced. Do not underrate the gravity of obstetric operations because you will grow careless, and, too, do not overrate the dangers because then the mother or the child may suffer while you hesitate.

4. The question of assistance is an important one. It is unjust and cruel to give the obstetric patient less efficient service than the gynecologic patient. In simple perineorrhaphies there are usually two assistants, besides the nurse, and this ought to be the rule for obstetric cases. In practice this is usually impossible, but there should be at least one assistant for the anesthetic, the nurse and the husband, if he can stand it, or a courageous neighbor.

5. Before each operation that is out of the ordinary, read up on the case, get the plan of procedure clearly in your mind. In all cases just before operating do the various steps first in the air before the patient, and review the possible complications. Be ready, however, to alter the whole plan of procedure at any stage, if necessary.

6. An accurate diagnosis, re-affirmed after the patient is on the table and asleep. It may be necessary to desist from operating and put the patient back to bed, or select another plan entirely. Do not go through with the original plan if you find things different than expected to save yourself trouble or mortification. Usually you will get more of each if you do so.

7. *After every operation, mild or severe, examine the patient carefully*—uterus, lower uterine segment, cervix, vagina, perineum, to discover any and all injuries to the parturient canal. You must *positively know and record* the number and extent of the puerperal wounds.

Kinds of Operations—Obstetric operations are of two kinds; first, those that deliver the child; second, those that prepare the parts for delivery. Some operations are in both classes, e. g., symphysiotomy.

In the first class we consider extraction: (a) by the breech; (b) by the head.

In the second class there are: (a) turning the child from one presentation to another; (b) changing the position of the child; (c) changing the attitude; (d) enlarging the passages, soft and hard; (e) making new passages; (f) inducing labor, etc.

Extraction—Extraction means the artificial removal of the fetus from the uterus. This may be through the genital passages, or the abdominal wall, or may mean extraction by the head or by the breech. May mean extraction entire, or after mutilating the fetus.

We will limit the term to the extraction of the fetus through the natural passages without any diminution of its size. Thus we may have extraction by the head or by the breech. Before taking up either, however, we will study the indications, conditions, etc., for extraction in general.

Why should we want to extract?

Why should we want to terminate labor?

Because certain conditions exist which command the termination of labor and the woman herself cannot do it. Here is the idea—*Insufficiency of the powers of labor;* this is the reason we extract.

The problem is not perfectly simple because we find many kinds of conditions surrounding a case. These will usually be ranged under one of the following heads.

I. *The Powers*—The parts are normal, the fetus is normal (i.e., normal resistances), but the woman cannot deliver the child. This is weakness of the powers of labor. In these cases the pains are few and far between, weak and short.

II. The powers may be normal, pains good and strong or even stronger than normal, but there is some increase in the resistances. Either the fetus is too large or the pelvis too small, and labor cannot be terminated by nature. These are cases where the powers are relatively weak and need assistance from art.

III. The powers are normal, the parts are normal, the fetus is of normal size, but some accident has happened, e. g., prolapse of the cord, of eclampsia, and it is highly desirable that the labor be terminated rapidly, more rapidly than nature would do it. This is relative weakness of powers due to some complication.

Under extraction we consider—

(1) Extraction by the head—the forceps operation;

(2) Extraction by the breech—pulling on the body of the child.

The simplest form of extraction is the assisting of nature in breech cases—when the breech of the child has been delivered.

MANUAL AID.

Breech labors are normal labors. The fetal and maternal mortalities are higher than in the head labors, but the large majority of cases terminate spontaneously, therefore eutochia. Formerly breech labors were considered very bad for the child and it was stated that 25% to 30% died during delivery. Even as late as '93 the mortality was given as 10%. This is not so. When there is a high mortality it is usually due to errors of art.

That the fetus runs greater danger than in head presentations is evident and in very large number of cases the mortality would certainly be higher. This is due:

1. To compression of the cord between the body of the child and the soft parts. Occurs as soon as the navel passes the vulva.
2. Premature detachment of the placenta because of emptying of the uterus.

3. Pressure of the hard head against the placenta. In head cases the soft breech presses against the placenta.
4. After breech is expelled, a large portion of the fetus is exposed to air, therefore respiratōry stimulation, and the head is still in utero—different when head is delivered.
5. When the soft parts of the mother are poorly prepared, and this is likely because the small and soft breech does not dilate them as much as the head; there may be delay when the shoulders come to pass through or with the exit of the head. Of course this delay aggravates all preceding causes.
6. In case where traction is exerted on the body too soon, the arms may be stripped up above the head and the delay necessary to bring them down may kill the child.
7. The cervix may close down on the neck, really buttonholing the head in the uterus. Due to too early attempts at extraction, or too much manipulation.
8. Finally, children may not live after delivery, because of sepsis or injury.

For the Mother—There is danger of laceration of the tissues—cervix, vagina, perineum—due to too rapid extraction in imperfectly prepared parts or to the necessary manipulations (sepsis).

Treatment—The treatment of normal breech presentation is "watchful expectancy." If no indication arises for the termination of labor, wait. Do not rupture the bag of waters—"preserve the integrity of the fluid wedge." Watch the heart tones or feel the pulse in the child's foot. If meconium comes away it is of no importance, being simply pressed out by the increased intra-uterine pressure. Finger in the anus also, shows the life of the fetus. When the second stage is begun—lithotomy position, preferably on a table, but usually across the bed. Have everything ready for asphyxia neonatorum. No chloroform, generally.

I. After breech is delivered tell woman to bear down strongly.

II. Assistant presses the uterus down firmly, if she cannot or will not bear down, e. g., during operation or under anesthesia. This is to prevent the arms from being stripped up over the head.

III. If the child does not make rapid progress, it is necessary to render *manual aid.* Seldom necessary in multiparae, frequently in primiparae. Have an assistant make continuous even pressure over the whole uterus, from the outside. Take the breech in two hands, thumbs over the back, fingers grasping thighs and pelvis, make even traction downward, in the axis of the inlet. Pull down a short loop of the cord so that it may not be pulled on by the fetus.

Gentle traction combined with steady supra-pubic pressure till the anterior shoulder blade becomes visible or palpable under the

pubis. Now grasp the feet of the child, and swing them through an arc, toward the side on which the belly of the child lies, with the other two fingers, pass over back of the child to the shoulder, over the shoulder down the humerus, to the elbow, them wipe the extremity over the face and chest of the child. The lifting of the fetus up to the side rotates the shoulder into the hollow of the sacrum, or, at least, gives more room to insert the hand. After this arm is delivered, rotate the child in the opposite direction, changing the operating hand, at the same time it may be necessary to turn the baby's chest bodily so as to bring the other shoulder posteriorly. The delivered arm is laid alongside the chest as a splint, the index finger is laid over the scapula of the other arm and the chest grasped full in the spread fingers. Then with gentle stuffing and rotary motions, pushing on the scapula with the index finger, the chest is rotated so as to bring the second arm behind. Leave the thumb outside during all these maneuvers, on the back, never inside the vulva. After the arms are delivered the hardest part is accomplished. Head enters inlet as shoulders pass outlet.

Deliver the head according to the natural mechanism.

Head passes through the pelvis best if well flexed. To aid this have the assistant keep up firm pressure on the fundus uteri. Put child astride your arm, two fingers in the mouth, and flex chin on sternum. Two fingers now pass over the nape of the neck to the sternum and traction on both hands together in the line of the inlet. Pull down till the nape of the neck is well under the pubis, now stand off to the side and lift up the child, still keeping the chin well flexed. Chin, face, forehead and occiput are delivered over the perineum.

During the delivery of the head the danger of asphyxia is slight and you must protect the perineum, therefore deliver slowly. In primiparae may perform episiotomy, but if you have the labor well in hand it is not necessary. For your first cases do it.

This method of delivery of the head is called the *Smellie-Veit.* It was first used by Mauriceau. Smellie modified it, its place was taken for a time by others, then Veit published a work on it which brought it into popularity. There are many other methods, but this is one of the best. Wiegand-Martin method also good.

Manual aid is the simplest operation under extraction. It is simply aiding nature to expel the fetus when it is passing breech first and the resistances are a little too great, causing delay in the delivery of the shoulders and head, which is dangerous for the fetus.

Treatment, then, breech presentation is (1) watchful expectancy till the navel has been delivered; then (2) have woman bear down; (3) assistant presses on the whole uterus; (4) manual aid.

TREATMENT OF BREECH PRESENTATION WITH BREECH NOT ENGAGED.

In cases where the breech has not engaged remember that the breech normally remains high up for a long time. That it usually comes down with the rupture of the bag of waters late. That when it becomes necessary to deliver the child the case is pathological and must be strongly differentiated from those requiring "manual aid" simply.

Indications—For interference when the breech is high up are the same as for extraction in general:

(1) Insufficiency of the powers. Weak pains, mal-development of the uterus, poor innervation, rupture of the uterus, death of the patient.

(2) Relative insufficiency of the powers of labor, due to increase of the resistances on the part of mother or of the child.

(a) On the part of the mother—

Rigidity of the cervix, vagina, perineum, e. g., young primiparae or contracted pelvis, e. g., generally contracted pelvis.

(b) Unusual size of the child, mal-position, etc.

(3) Insufficiency of the powers in relation to the necessary rapid termination of labor, i. e.,

(a) Some complication, e. g., eclampsia, sepsis, acute and chronic heart and lung diseases, pneumonia, etc., hemorrhage.

(b) On the part of the fetus, asphyxia from any cause.

The Conditions—

1. Bag of waters must be ruptured.
2. Cervix effaced and os dilated.
3. Pelvis not too contracted.

"2." Cervix must be effaced and os dilated—These conditions are important in relation to ease of extraction, the integrity of the maternal tissues and the life of the child. Sometimes necessary in the interest of the child to operate without this condition; then dilate cervix, or incise it.

"3." The pelvis must not be too contracted. A conjugata vera under 8 cm. will seldom allow a normally developed full term child through. With conjugata vera of 8 cm. operation is difficult; over 8cm. the chances are better. In a generally contracted pelvis the figures are all ½ cm. higher.

Method of preparation will reserve for consideration under Forceps.

Operation—Operation divides itself into four stages or acts:

1. Extraction of the breech or foot to the navel.
2. Extraction up to the shoulder.
3. Bringing down the arms.
4. Delivery of the head.

Treatment of the First Act—The method of treatment of the first act depends upon the presentation. If a footling presentation, or if you have done a version, the foot being brought down, the extraction is made on the foot. It is not necessary to have the two extremities. Better one should lie with the breech so as to dilate cervix more.

Method—Grasp leg with two hands, thumbs parallel to the long bones. Traction downward in the direction of the axis of the inlet, intermittent and with the pains. If the traction is parallel with the long axis of the limb and with the body and in the line of the axis of the inlet, if done slowly, there is hardly any danger of producing a luxation of a fracture, if otherwise, fractures are common. As the limb appears the hands grasp the part higher up. When the anus appears, traction must be more horizontal—the breech turns upward of itself. Now possible to put the finger over the back down the crest of the ilium into the opposite groin. This aids the extraction and favors rotation of the back to the front. Use care not to fracture the femur. When hips are delivered continue the tractions, slowly, with the pains and let the other foot fall out itself. If the cord is around the buttocks or between the legs, slide it over one of the nates.

If too short, cut between two artery forceps. After navel appears first act is ended. When the case is a complete or double breech or a single breech, "mode de fesses," there are several methods of completing the first act of extraction:

(1) Bring down a foot—

In cases where the breech has not yet engaged and there is some immediate danger or prospective indication for the rapid termination of labor, the method of election is to go in and bring down a foot, on which the extraction is done.

Method—Preparations the same as for version (later).

Hand to use—*Rule:* Take that hand which, when placed in the uterus, will have its palm directed toward the part to be grasped, thus in Sac. L. A. left hand, in Sac. D. P. right hand. Hand is formed into a cone, well lubricated, and passed through the vulva with a boring motion, through the cervix into lower uterine segment. If the case is one of double breech it is easy to get a foot and perhaps only necessary to pass two fingers into the cervix.

Rule: Grasp the anterior foot, i. e., the one nearer the anterior wall of the uterus. If the case is one of single breech the hand must pass quite high up, as far as the knee. Flex the leg on the thigh by

putting the index finger in the popliteal space and sliding the other fingers down the leg till the ankle is between the fingers. Now draw the foot slowly down into the vagina, along the side of the pelvis, or somewhat posteriorly. This procedure is advisable in cases of contracted pelvis and in breech presentations with pendulous abdomen. There are other methods which may be used.

(2) *The Finger in the Groin*—This should be limited to cases where the breech is wedged so tightly in the pelvis that it cannot be displaced to get a foot. It is to be preferred above the use of the fillet, or the forceps, or the blunt hook. Almost always possible to get down a foot if care and patience be used.

Method—Preparations same as for version, etc. Whole hand passed into the vagina. In Sac. L. A. the right hand, later the left. One finger, never more, passed into the groin from before backwards. Support the wrist with the other hand. Use the second finger when the first gets tired, then change hands. In a primipara with tight perineum and vagina this is by no means an easy operation. Hands get very tired. As soon as you can reach the posterior groin, put a finger in that also, and now the operation is simple. Remember that time is no factor, also that sometimes a slight vis a fronte is sufficient to start the breech. When the breech is delivered, let the legs alone, they will drop down themselves.

Advantages of this method are that there is little danger of injuring the fetus, cutting the skin, tearing the vessels in the groin, or opening the belly. Finger the gentlest tractor. You may fracture the neck of the femur, if the traction is not applied properly. Pull toward the fetal body so that there is no pressure on the neck of the femur.

(3) *Use of the Fillet* (or sling).

An ordinary tape may be passed around the thigh in the groin. May use a ring to which the tape is tied, or a sling carrier, of which there are many forms. All are open to the same objection—danger of fracture of the femur, tearing of the skin of the groin, laying bare the femoral vessels, and unnecessary. A smooth ring is tied on the corner of a silk handkerchief, making a good fillet for the purpose.

It is passed from the back through the groin, well down between the thighs; then bring the ring out by the finger passed between the thighs. Traction similar to that with the finger, down and backward toward the body of the child, so as to avoid breaking the femur. When the hips are so far descended that you can reach the other groin, insert the finger in that, pass the finger from behind over the crest of the ilium to the groin. Never use the blunt hook, except on the dead child. Same said of the breech forceps, which really is a pair of blunt hooks. The forceps is not to be applied to the

breech. Danger of slipping off, fracture of the pelvis, third, inefficient.

We have now considered the methods of completing the first act. To sum up:

(1) Traction on the leg, if a footling, or after a version.
(2) Bring down a leg in complete or single breech.
(3) If breech too firmly fixed, traction on it by means of one finger in the groin, or the fillet.

Iron hook, the forceps, the breech forceps, not to be used unless the fetus is dead. Even then is bad.

The second, third and fourth acts of extraction have been already described under Manual Aid. It remains to go over the various difficulties that can arise during the operation.

During the first act—

Bringing down the posterior foot, the anterior hip catching on the symphysis—obstruction to delivery. Sometimes the first leg crosses the second, which lies athwart the pelvis.

Treatment—Put a sling on the ankle delivered, bring down the other foot, and extract on the two feet.

During the second act—

Usually no difficulty arises, unless it be a large, fat baby. Careful where the pressure of the finger is put, because danger of rupture of the liver, or the full colon. If there is difficulty, examine to see if there is a monster.

Important clinical hint—

With large babies and contracted pelves, do not pull out trunk till the anterior scapula becomes visible, because then the baby's head will wedge the arms, which are often stripped up along the head, into the pelvis and make their delivery difficult, perhaps impossible, therefore begin the third act sooner. Necessary to put the hand in further, wherefore use whole hand. There is danger of lacerating the perineum by the hand and fetus together. Episiotomy.

Third Act—Greatest difficulty generally here. In normal cases the arms lie folded across the chest and appear with the thorax. If traction is made on the trunk, and if the assistant does not keep up pressure on the fundus the arms may be arrested at the inlet and be stripped up alongside the head. Due also to an undilated cervix.

Treatment—Same as usual, but use four fingers, go high up into the pelvis, posterior arm first. Be sure to be at the elbow and push the arm to the other side of the pelvis and into the hollow of the sacrum, over the face of the infant.

Not allowable to pull down shoulder to make arm more accessible. Be sure the arm is posterior, lift up the fetus well. If after repeated trials you do not succeed, or there is danger of breaking the arm, turn the chest around and bring down the other arm. After

this is delivered bring down the first arm, turning the chest again. Done slowly and carefully it is usually successful.

A second complication of the third act is where the arms are thrown back into the nape of the neck and cross the pelvis under the head. These are bad cases.

Treatment—The assistant should desist from pressing on the abdomen.

(1) With hand as far as possible behind, try to push the elbow over the face, taking first that arm which is more posterior.

(2) Turn the child around, passing in two fingers from in front, and pushing, not pulling, on the shoulder with these two fingers so as to bring the arm behind, where there is more room.

(3) If this does not succeed, turn the other side and try to deliver the anterior arm and shoulder first, by turning it posteriorly. Aid all maneuvers by pressure on the arm and head from the outside.

In both these complications, if you do not succeed in delivering the arms it may be necessary to deliver them by brute force and run the risk of breaking them. (Bad.)

Complications During the Fourth Act—

A. Head arrested at the inlet.—Occurs in contracted pelves and with large babies and hard heads. Antero-posterior diameter of head in transverse diameter of pelvis.

Treatment—

(1) Smellie-Veit and Martin-Wiegand methods, remembering:
   (a) Mouth high up to one side.
   (b) Head not to be too strongly flexed.
   (c) Rotation not to be effected till the head is well in pelvis.
   (d) Pull in the axis of inlet.
(2) Pressure from the outside on the head, with
(3) The Walcher position.
(4) Push head slightly to one side to bring biparietal diameter to side of promontory.

In difficult cases use all four. Some authors advise the use of the forceps in these bad cases. Objections are:

There is generally very little time, child almost dead; it is hard and dangerous to mother; and not adapted to this class of cases, because the head is above the inlet. If the head will not come into the pelvis in spite of justifiable traction and pressure, stop efforts to deliver. Do not tear the woman to pieces, or the child's head off. Now there is no occasion to hurry. May leave case to nature or do craniotomy. Child almost always dead by this time and in other cases is lost beyond recovery.

B. In rare cases the head may be arrested at the pelvic floor.

Usually the head comes out too fast and the perineum is torn, therefore it is sometimes advised to do an episiotomy (primiparae). If there is resistance at the pelvic floor, do episiotomy to save the child. Sometimes necessary to do forceps and especially if the outlet is contracted (masculine pelvis). Rare, but if indicated is justifiable to use forceps here.

All these anomalies may occur with the breech extraction when the rotation of the breech is normal, i. e., with the back to the front.

We now take up—

Abnormal Rotation in Breech Presentation—For the normal mechanism of breech presentations it is necessary for the back to rotate anteriorly. This brings the arms into the hollow of the sacrum, where there is more room, the occiput to the pubis and the head may now be easily delivered. In some breech deliveries the back turns to the mother's back, the child's belly looks up toward the pubis.

This occurs—

(1) In footling presentations, when the posterior foot has come down;
(2) After versions by the foot, when the posterior foot is brought down;
(3) Rarely during an otherwise normal extraction of the breech by improper attempts at rotation.

In footling presentations when the posterior foot is down, the usual mechanism is that the back rotates three-fourths of the circle, past the promontory or the sacrum to the opposite side of the pelvis and a normal back anterior presentation results. The back rotates in the opposite direction from that which one would expect.

During an extraction, therefore, when you notice this, do not try to oppose the rotation but seek to aid it. By not appreciating this point and resisting the mechanism sought by nature, the back may remain directed behind. During the first and second acts this is of little moment. You watch the rotation intended by nature and seek to aid it by pulling harder on the groin, which tends to turn forward.

Third Act—Bring down the arms.

If these are across the chest, usually little trouble. Same rule as usual but go in from behind (the back being here), and get the arms down behind the pubis and out over the front of the chest.

If the arms are thrown up along the side of the head great difficulty is met.

Under no circumstances bring down the arms over the back of the fetus, always in front, and use the same rules as in normal rotation, but reversed, i. e., from behind forwards.

Fourth Act—Delivery of the head:

Here often great trouble arises, but sometimes labor may termi-

nate spontaneously. Chin flexes on the sternum, nape pivots on perineum, chin, face, forehead appear from under the pubis and finally occiput comes out. If necessary to aid nature, aid in this way—Smellie-Veit upside down.

Should the chin be too far up and off to one side, may try to bring the face behind.

La Chapelle's Method—Half hand passed in from the side opposite to which the chin lies, and on retracting hand try to pull face with it. Rarely successful, but should be tried and combined with external manipulation. De Lee's method—Hand on occiput externally, two fingers on face inside, get a purchase on the malar bone, and pushing the face to the back the outside hand pulls occiput forward at the same time.

Van Hoorn's Method—Lift the child up towards the mother's belly, flexing body over the pubis, occiput comes out, then forehead, face, chin last; front of the neck pivots behind the pubis. This is an imitation of nature's method in some of these cases.

In these cases the forceps may be used if there is time and the child is surely still alive.

Note—The delivery has been described as it is when the course is pathologic throughout, but at any point in a pathologic delivery it may become normal, and likewise a normal delivery may at any time become pathologic.

First two acts to be done slowly.

Think out the whole mechanism yourself first.

Last two acts, carefully but quickly. Four minutes for the arms, four minutes for the head. More time lost is dangerous. Children sometimes live after five minutes' compression of the cord, but asphyxia is often profound, resulting in atelectasis, pneumonia, sepsis.

CERVIX COMPLICATIONS.

Finally should be mentioned complications on the part of the cervix.

If extraction is undertaken when the cervix is still undilated there is danger to the fetus and the mother.

For the Mother—If the cervix tears, hemorrhage in the third stage. Especially in placenta previa. Later sepsis. Rupture of the uterus.

For the Child—Arms may be stripped over the head, and delay in their delivery kill the infant. After the shoulders are delivered the cervix may close down on the neck, buttonholing the head in the uterus.

Causes—

1. From brusque manipulation.
2. Frequent attempts at delivery.

3. Too much fingering in cervix.

4. Extraction when cervix not well dilated, and it is more common in footling presentations than in double breech.

With the causes you have the prevention:

If the cervix gets around the child's neck, traction on the child brings the cervix into view as a purplish band. Try to strip it back over the head. If impossible, incise it. Careful about extracting forcibly. Let the fetus get air by holding back the soft parts with a speculum and with the fingers, allowing the air to get to the mouth. Schroeder did so for 20 minutes. Stowe advises tracheotomy. Indication may arise, but rare.

SCHEME.

Breech
Deliveries.
Normal cases.
Manual aid.
Abnormal cases.
Extraction.
Indications.
1.———
2.———
3.———
Conditions.
1.———
2.———
3.———
Operation,
four stages.
I. Footling.
Breech.
a. Bring down foot.
b. Finger in groin.
c. Sling.
d. Hook.
e. Forceps.
Dead child.
II. Deliver to shoulders.
III. Delivery of shoulders.
IV. Delivery of head.

COMPLICATIONS WITH NORMAL ROTATION OF BACK.
I. Posterior foot brought down.
II. Big, fat baby, small pelvis.
III. Arms high up; arms in nape.
IV. Head arrested at inlet.

COMPLICATIONS WITH ABNORMAL ROTATION OF BACK.
I. Post. foot. Try to rotate back in the direction sought by nature.
II. Same. Try to rotate as in No. I.
III. Arms high—nape of neck.
IV. Head with chin on pubis.
a. Mariceau - Smellie-Veit upside down.
b. La Chapelle method.
c. De Lee's method.
d. Van Hoorn's method.
e. Forceps.
f. Craniotomy.
Resistance from the cervix.
Resistance from the perineum.

THE FORCEPS OPERATION.

History—(Schroeder.) 185 years since first pair of forceps was published.

Cause—Midwives had obstetrics. Men called only to the worst cases. On the other hand, the physicians were not regarded as of much account, as they could render but little aid when they were called, "and this expedient," says Smellie, "raised a general clamor among the women, who observed that when recourse was had to the assistance of a man-midwife, either the mother or the child or both were lost." This feeling is still prevalent among foreigners and the uneducated.

In the last of the 16th century, the surgeons of note, especially in France, began to study and practice obstetrics, and the need of an instrument which would deliver a head impacted in the pelvis was sorely felt, and as soon as it was invented the position of the surgeon as an accoucher was raised very high and the midwives were relegated to their proper position, as aids in normal labor cases only.

Obstetricians preferred to be called to cases where the position of the baby was pathological, e. g., transverse presentations, or breech, since here they could turn the child, or pull on a foot; whereas, by the head they had no means of extraction. Thus is it not surprising that the idea of the forceps was so long in coming? Hippocrates had advised in such cases to pull on the head with the hands. Pierre Franco, in 1561, advised the use of a three-bladed duck-bill speculum to grasp the head with. Smellie advised the use of fillets, brought with great difficulty over the head. The Japanese use such appliances even now, introduced with pieces of whale bone; they also use a silk net. (Kangara, 1832.)

Finally, in 1723, Palfyn, a surgeon and anatomist in Geneva, laid before the Paris Academie de Medicine his forceps for the extraction of the fetal head without danger to the mother or the fetus. The rumor that there existed an instrument of this kind was already extant and for many years the forceps had been in the possession of the Chamberlen family, but they had kept it a secret, selling the forceps wherever they could but not allowing it to be published. When Palfyn exhibited his instrument the idea met with general disapproval. This came because the knowledge of the condition of the pelvis and mechanical phenomena of labor were very limited. De la Motte, in speaking of the forceps, says: "That the thing is as impossible as to pass a cable through the eye of a needle, because, how can one pass an instrument of steel where one cannot even pass a catheter, or a douche point, not even a myrtle leaf, etc." He adds, overcome by the great importance of such a discovery, the following damning judgment on the Chamberlen family: "If the thing is true, as it is false, and also that this man died without rendering his instrument public, he deserves that a worm devour his vitals throughout all eternity, because of the crime he has committed in not giving the means to save the lives of an infinite number of poor

infants who are lost by the absence of such aid." This applied to the Chamberlen family because there had existed with them quite a complete forceps for many years.

The first forceps was invented probably in 1580 or 1590 by Peter Chamberlen, the elder, the son of a Huguenot, Wm. Chamberlen, who fled from Paris in 1569 and settled in Southampton. In 1670 one of the large family went to Paris to sell the instrument for $7,500.00. Mariceau, to test the value of Chamberlen's pretenses, suggested that the latter attempt the delivery of a woman with extreme contraction of the pelvis, upon whom he had previously decided to perform Caesarean section. Chamberlen declared that nothing could be easier, and at once, in a private room, set about the task. After three hours of vain effort, he was obliged to acknowledge his defeat. The woman died from injury to the uterus, the negotiations for the sale were dropped, and Chamberlen returned with his secret unrevealed to England. Later he sold the secret to a Roonhuysen, in Amsterdam, who sold it in turn to any doctor having the necessary large amount of money—but sold only half the forceps, adding fraud to infamy. A student in the home of Roonhuysen had a chance to see the forceps when the former was absent, gave a picture of it to a friend who published it. But Palfyn's forceps, and many improvements, made this hardly necessary.

Palfyn's instrument was a heavy one, consisting of two curved parallel spoons, with heavy wooden handles, tied together with tapes.

Other obstetricians improved them by crossing the blades and lengthening them, giving them also a better shape. In England Smellie improved the forceps, but retained the short form and put on the English lock. Up to 1880 there were over 200 different forceps. Now probably over 500. If ever you think of inventing a new forceps, first consult Kilian's Armamentarium lucinae.

Definition—The forceps of obstetrics is an instrument designed to extract the fetus by the head, from the maternal passages, without injury to it or to the mother. As soon as the right of either is encroached upon, the instrument ceases to be the forceps of obstetrics, but simply an instrument of extraction, similar to the craniotomy forceps, and not as good.

Description—Consists of two blades, "right" and "left," and they are named from that part which goes in the pelvis. Each blade has a handle and a hook-like projection; curved on the flat—the cephalic curve; curved on the edge—the pelvic curve. Fenestrated to give lightness and better hold on the head. Placed together the forceps is made by crossing at the lock. This consists of a shoulder-like projection of the blade which is covered by a flange on the other blade. The Simpson is the one adopted by the Vienna school. Is,

therefore, sometimes known as the Vienna School Forceps. Measurements:

Length	35	cm.
Handles	15	cm.
Cephalic curve	8	cm.
Pelvic curve	7½	cm.
Distance between tips	2½	cm.
Fenestra	11x4½	cm.

There is a distance between the shafts of the blades big enough to put the finger in. The cephalic curve of the Simpson forceps is large, and, therefore, there is little danger to the fetal head from compression. Some forceps, especially the German, have a murderous cephalic curve. The forceps should feather a little. Steel, welded steel throughout—edges well rounded. Hollow handles, well nickeled, not heavier than 1½ pounds. The front of the forceps is the concavity, the side on which the lock is, and to which the tips point. The forceps lies in the right oblique, left oblique, transverse diameter, etc., when a line drawn through the fenestrae lies in one or the other diameter. For example, we say the forceps lies in the right oblique diameter of the pelvis when a line drawn through the center of the fenestrae lies in this diameter. The front of the forceps and the tips will point to the right side.

When we speak of right, left, front, back, upper, lower, we always refer to these directions *on the mother*. If we wish to indicate them on the fetus it must be specifically so stated.

The Functions of the Forceps—Simply mechanical. The forceps does irritate the lower uterine segment and sometimes evokes strong pains. This was considered by some as the main function and called the "Dynamic Action" of the forceps. This is not constant, and of little importance.

Nor is the forceps an instrument of *compression*. Experimentally proven that the volume of the head cannot be reduced more than a few cubic mm. without great danger to the child. Pressure in one diameter causes a bulging out in the others. A certain amount of compression is inevitable, but we seek to avoid it as much as possible. You must not hope by compression of the head to bring it through a narrow pelvis alive.

The forceps is not an instrument to alter the position of the head in the pelvis, e. g., to change an occipito-posterior to an occipito-anterior position. It may, however, be used to aid rotation during the tractions, and thus imitate the natural mechanism.

The forceps is not an instrument to be used as a lever or a twister, i. e., pendulum motions and twisting are not allowed, because then the fulcrum is part of the mother and she is dangerously bruised and torn. These motions are not observed in nature.

The function, then, of the forceps is simply one of *traction*, stationary traction. It supplies, from below, a lack of force from above, and only when used as such an instrument will it remain harmless.

Conditions for Forceps Operation—

(1) Head must be engaged—

If the head is still movable above the inlet there are better operations than forceps, i. e., prophylactic version. How to tell when the head is engaged:

(a) When lowest part of the head reaches a line between the spines of the ischii it is engaged. Span the spines with the fingers and estimate.

(b) By the covering of the sacrum. Two-thirds must be covered by the head.

(c) By the covering of the symphysis; three-fourths must be covered (not very good).

In some cases the head may be fixed in the inlet; if indications arise a cautious trial of the forceps is here allowable.

(2) The pelvis must not be too small, nor the head too large. In contracted pelves in which the conjugata vera is less than 8½ cm. it is not safe to use forceps. The pelvic outlet must not be too small. If the baby is hydrocephalic, no forceps, because the blades will generally slip off, nor must the head be too small. No forceps to small heads or after perforation. Use a small forceps if necessary for a premature infant.

(3) Bag of waters must be ruptured and membranes out of the way—danger of dislocation of the placenta, causing asphyxia of child and hemorrhage.

(4) Cervix must be effaced and os dilated; or it must be positively and easily dilatable. [Perineum should be dilated or easily dilatable—S.]

Reasons—(a) May tear the cervix, which may extend into the abdominal cavity—peritonitis or immediate hemorrhage. (b) May grasp the cervix in the forceps and crush or tear it off. (c) It pulls the uterus down, stretching or tearing its pelvic attachments, causing later prolapse, etc. (d) It pulls the bladder down, stretching or tearing its pelvic attachments, causing later incontinence or dysuria, etc.

(5) Child must be living—

If dead, craniotomy. If in doubt, forceps always.

Indications for the Forceps Operation—

In general, the indications have already been given under extraction. They are the same, since extracting by the breech is not different from extraction by the head, except that in the latter we cannot take hold of the fetus directly with the hands, but must use a pair of forceps. Will now mention the indications approximately in the order of frequency:

(1) *Insufficiency of the expulsive powers of labor*: These cases form 75% of the forceps operations in America. Head has come down to the perineum, has perhaps rotated anteriorly and become visible during the pains, but the patient is exhausted, does not press down, and the uterine contractions are feeble. The head may be a little large or the perineum a little more resistant than usual. These are cases of relative insufficiency of the powers of labor. A caput succedaneum begins to form on the head and the child's life becomes endangered from asphyxia. In regard to the time to operate consider—

(1) The size of the caput succedaneum.
(2) The fetal heart tones.
(3) The condition of the woman. Must operate before she is too much exhausted.
(4) An arbitrary limit of 2½ to 3 hours after complete dilatation and the head has come onto the perineum.

In these cases the signs are:

(a) Asphyxia; rapid or very slow heart tones; liquor amnii stained with fresh meconium and violent movements of the fetus. These give the indication for terminating the labor.
(b) Signs of danger on the part of the mother from prolonged labor; exhaustion; threatened rupture of the uterus, etc.

(2) *Deep transverse arrest:* When the occiput, owing to the head being deflexed, or something else, does not rotate anteriorly. Sagittal suture lies in the transverse diameter of the pelvis, small fontanelle on one side, usually the right, large on the other, both on the same level, nearly. Labor comes to a standstill. Military attitude of fetus. Child has head set squarely on shoulders in a position median between face and occipital.

(3) *Complications in Labor*:

a. Eclampsia.
b. Fever; infection during labor; endometritis septica; tympani uteri.
c. Acute diseases, e. g., pneumonia.
d. Chronic diseases; tuberculosis; emphysema; heart disease, causing too much work on the heart, or edema pulmonum.
e. Hernia, especially if incarcerated.
f. Placenta previa, certain cases.
g. Premature detachment of placenta.
h. Prolapse of the cord.

Not by any means all the indications, but they are the most common.

(4) *Face and Brow Presentation*: Per se, they do not give the indication for forceps, but above indications more likely to be present.

(5) *Contracted Pelvis*: Very seldom an indication for forceps here. When the head is movable above the pelvis, not proper to use the forceps; better operation is prophylactic version, or you must wait till the head is engaged. Never use the forceps to draw the head into the pelvis nor to dilate the cervix. If the head has gotten past the inlet in a flat pelvis, usually there is no indication for the forceps, since the labor usually terminates quickly. But in a generally contracted pelvis labor may have to be terminated by the forceps. Wait till the head is well moulded, and remember, great care is necessary since there is much danger of bruising and tearing the soft parts, even rupturing the pelvic joints.

VI. *Finally*—Forceps may, very exceptionally, be used on the *after-coming head.* May also be applied to the breech if the baby is dead; no objections to the use of the breech forceps or the blunt hook on the breech of a dead baby. Thus, you see, that indications must be covered by conditions. The indications may be present but the conditions absent, e. g., the fetus may be in danger of asphyxia but the cervix not dilated; the mother may have eclampsia but the cervix not dilated, etc.

Preparations for the Operation—Same as for a version, or any obstetrical operation.

a. Disinfection,—subjective and objective.

b. Transverse position in bed. *Better the kitchen table.*

c. Rectum and bladder empty.

d. Anesthetic,—almost always in primiparae, not actually necessary in multiparae, but is usually given.

e. Accurate diagnosis of presentation and position, confirmed just before operating.

f. Have everything ready for asphyxia neonatorum and post partum hemorrhage.

g. Room properly ordered, good light, plenty tables, etc. See "Obstetrics for Nurses," page 165.

Forceps operation bloodiest of obstetrics. Never an operation of convenience. In primiparae vagina usually bruised and torn, cervix sometimes in shreds, or even torn from the vagina.

We will consider the usual forceps operation. Head at the outlet of the pelvis, rotation being nearly complete or completed, the so-called,

LOW FORCEPS OPERATION.

Rule—The front of the forceps must point in the direction of the point of direction.

There are four stages to the operation:

First Act—*Application of the Blades.* Second Act—*Adaptation.* Third Act—*Extraction.* Fourth Act—*Removal.*

First Act—Application of the Blades—

There are two blades to the forceps: left, right. The left blade is the one that lies in the left side of the mother. It is always grasped by the left hand and is always passed first. The right is that blade which lies in the right side of the mother, and is always held in the right hand.

Left Blade First—Two fingers of the right hand are passed into the vulva, vagina and, if the cervix is felt, into the cervix, and inside the membranes. Nothing must intervene between the forceps and the head of the child. To be certain of this the fingers are passed alongside the head and the forceps inserted between the head and the fingers. The fingers are passed as high up as possible, and the tip of the forceps must be guarded as long as possible, being sure that the tip passes inside the cervix. The thumb of the hand guides and presses the blade in. When the fenestrum of the blade goes inside the vulva, time is come to sink the handles. When the lock has come near the perineum the first half of this act is completed. If properly done the blade falls into place almost of its own weight.

There are three methods of grasping the forceps:

(1) Like a pen. (2) Like a scalpel. (3) Like an amputating knife.

During the first part of the act like a pen, then like a scalpel, passed with the carefulness of a sound. Third method is not good, is clumsy and harmful. After introduction of the blade, examine to see if it lies properly.

Now pass the right blade. Reason of this is because the lock is on top of the forceps and if the right is passed first the left will cross on top of the right, and then one would have to uncross the forceps, while the blades are inside, with danger of mutilating the maternal soft parts. Same rules to be observed. In locking, remember the rule that the "front" of the forceps points in the direction of the small fontanelle. Now listen for the heart tones. Press the handles together while listening. If the tones get weaker and slower it indicates that the cord is probably compressed by the tips of the blades.

Second Act—Adaptation of the blades or locking—

In the operation under consideration,—low forceps,—the small fontanelle has already rotated anteriorly and the blades of the forceps, after being applied, fit naturally to the sides of the head. If the small fontanelle should not have completely rotated, or if the blades do not lie in a position so that they can be locked, they must be brought into position for locking; this is called adaptation, or locking.

Before attempting this maneuver be sure that there is no maternal tissue in the blades. The simplest method to bring the blades into position is:

(1) To press the handles down toward the perineum, gently but firmly. If not successful:.

(2) Press them down, twisting them gently by means of the hooks on the handles. *Not too much force.*

(3) Press the handles down, push them into the pelvis, and twist, all at the same movement. This movement should succeed easily. But if it does not, do not persist because you will tear the cervix or vagina, and there is almost always some obstacle to the locking which must be recognized and removed.

(4) Remove the forceps and re-apply the blades. Examine to see if you have not made some mistake in the diagnosis. Perhaps there is hydrocephalus.

After locking, listen to the fetal heart tones. Examine to see if the cervix or hand, or cord, is caught in the grasp of the instrument.

Third Act—Extraction—

If the forceps lies properly the handles will point in the direction in which to make traction. After locking the forceps, make one gentle traction to see if the blades lie properly. This is called the "Trial Traction." Four points to remember—

(1) Always pull during a pain. If there are none, massage the uterus; if none then imitate the pain by making the traction gradual at first, slowly reaching an acme, and then slow relaxation.

(2) Power to use: Use as little as is necessary. Regulate power by the advance of the head. Never over 60 pounds. Disregard time, but watch the fetal heart tones.

(3) Stationary traction. No corkscrew movements or pendulum movements, because: 1st, unnecessary; 2nd, are not physiological; 3rd, always grave risks to maternal tissues.

(4) Pull in the axis of the pelvis.

After the trial traction, grasp the forceps in both hands, the right on the lock, the left on the handles, thumbs underneath, elbows at the sides, seated before the patient. One even, slow, gradually increasing traction, in the horizontal plane, or a little downward from this. Watch to see if any progress, sometimes can feel a sudden advancement of the head. If not, the forceps goes back and you can feel that no progress has been made. Wait a few minutes, count the heart tones, loosen the forceps; now a second traction, slow, stronger than the other. Examine for the position of the small fontanelle. If it was a little to one side, may find it now rotated toward the median line. Wait for some pains, since they may give the head a better position or cause marked progress.

When the head has begun to bulge the perineum, go more carefully. Pull straight out till the occiput is well under the pubis. When this is so, pull upward at an angle of 60 degrees from the horizontal. Watch the perineum, control the fetal heart tones, if they are all right, no need to hurry, but protect the perineum. Principles are:

(1) Slow delivery.

(2) Give the best diameters to the outlet.

(3) In hard cases may take off the forceps and express the head by Ritgen's method (pressure through the rectum), or from the perineum.

(4) In primiparae do episiotomy. Do not put the hand on the perineum, because you cannot see it tear and you may get the hand infected with feces. To accomplish these things, stand off to the left side of the patient, if you are right-handed; to the right side if left-handed; grasp the forceps with the right hand, about the lock, the little finger between the blades, and gently, slowly, line by line, flex the forceps over on the abdomen, turning the head out; at the same time pull the head up vertically to keep the nape applied to the under surface of the pubis. Same principles as when the head is being delivered normally. Bring the same diameters through.

Fourth Act—Removal—

Unlock the blades and let the head fall into other hand (keep the forceps clean, perhaps there are twins). In removing the forceps while head is still in the vulva, reverse the motion of application, being careful not to injure the child. Attend to the eyes and mouth as usual. Extraction of the body on general principles, but better, if possible, to leave the expulsion to the mother, as generally she is just awakening from the chloroform. Careful of the perineum with the shoulders.

FORCEPS IN THE UNUSUAL MECHANISMS OF OCCIPITAL PRESENTATION.

I. *Deep Transverse Arrest*—In some cases where a delay in labor has been manifest for some time, an examination reveals the head well down in the pelvis, the sagittal suture in the transverse diameter, the small fontanelle to one side, generally the right, the large fontanelle to the other side, and both on the same level. This condition is called, "Deep transverse arrest"—sometimes "Impaction,"—between tuberosities ischii,—and is caused by: 1st, a flat pelvis; 2nd, weakness of the powers of labor; 3rd, pendulous abdomen; 4th, dolicocephalus. Left to itself the condition ends by—

(a) Final rotation of the occiput forward, flexion taking place, then case is normal.

(b) The head may appear in the transverse diameter. This requires strong pains, small child, large pelvis.

(c) The occiput may rotate into the hollow of the sacrum, the head remaining flexed, or the forehead comes down, the head extending. These are forehead presentations.

Treatment—Keep the woman on that side to which the occiput points for a long time. Wait for a long time, as the occiput will rotate to the front in nearly all cases. If it does not after waiting 2½ hours, after complete dilatation of the cervix, may try to aid rotation by the maneuvers described under occipito posterior positions. Failing all these, the forceps.

Operation—We have two objects in view: first, we must complete the rotation; second, we must extract. It has been recommended to turn the head directly with the forceps, but this is bad practice, because if the vaginal walls lie fast to the head they will turn with it and be torn from their attachments. Extraction and rotation are accomplished together. Never turn the head without making, at the same time, traction. More traction than rotation always.

First Act—Application of the blades—

It is the rule to apply the blades to the sides of the head. In this case they would have to lie in the antero-posterior diameter of the pelvis. The Simpson forceps is not adapted to this because of the pelvic curve. Some French forceps, with very narrow blades, may be thus applied. The blades should not be applied in the long antero-posterior diameter of the head, since then one blade would be over the face and the other over the neck. The blades are applied in the oblique diameter of the pelvis.

Rule—The front of the forceps must point to that side of the pelvis in which the point of direction lies. If the occiput is to the left, the front of the forceps must point to the left side of the pelvis, and the forceps is placed so that when rotation is complete the pelvic curve will correspond to the curve of the pelvis. When the small fontanelle is to the right side, the forceps is applied in the right oblique; when the small fontanelle is to the left side, forceps is applied in the left oblique diameter of the pelvis. When we say that the forceps lies in an oblique diameter, it means that the line between the blades lies in the oblique. There are two ways of passing the blades:—

One is to pass them directly into the diameter in which you desire them.

The other, to pass them into the back part of the pelvis, one to each side, and then adapt them to the head in the proper diameter. The first requires greater skill and good knowledge of position. The latter is generally practiced.

Let us take Deep Transverse Arrest in *Right Occipital Position*—

Left blade in left hand, passed to the left side. Pass it into the region of left sacro-iliac joint. Right blade passed, likewise, to the region of the right sacro-iliac joint. The first blade is adapted before the second is passed.

Adaptation or Locking—Left blade is lifted to the right side, and the two fingers inside pull the blade around the pelvis toward the pubis till it passes by the face and comes to rest near the left ilio-pubic tubercle. Now the right blade is passed and pushed in the same manner to the side of the head. The forceps now lies in the right oblique and the point of the forceps looks to the same side as the point of direction. Right blade lies on the posterior parietal protuberance; the left, on the anterior malar bone. Difficulty in locking is overcome in the same manner as given before,—press them down toward the perineum somewhat and twist slightly by means of the hooks.

Extraction and Rotation—Make one gentle traction downward and forward. This is to see if rotation will not take place inside the forceps, which not seldom occurs. If there is no tendency for this, a second traction, accompanied by slight rotation, so as to bring the occiput to the front, i. e., from right to left. If some rotation has taken place, open the blades and let them rest now at the sides of the head. Make gentle tractions and rotation, which must be simultaneous, disregarding time, if fetal heart tones are good.

After rotation has occurred may take off the forceps and leave the case to nature. If the pains are strong, you can see that further traction is superfluous. When the small fontanelle has come to the front, the operation is exactly the same as has been described.

At first the handles of the forceps will not come together and must not be forced. This is because the head is not grasped from side to side, but from forehead to occiput. After rotation has occurred, the handles come together. Make frequent examinations to see how far the small fontanelle has rotated.

Occipito Posterior Position—These are too much dreaded by physicians. The large majority terminate spontaneously and favorably for both. Head enters the pelvis late, dilatation and effacement are not so rapid or complete. Pains are nagging and irregular. Labor tedious, may last a day or more. Bag of waters ruptures early. Head in coming down pushes the tissues in posterior part of the pelvis before it so that the perineum bulges early. Flexion of the head is late. Head almost always rotates to the transverse diameter, and then the forceps may easily terminate labor.

Treatment—The treatment, therefore, is one of watchful expectancy, till some indication arises to interfere. Various maneuvers have been tried to favor anterior rotation—

(1) Keep the woman on that side to which the occiput points.

(2) Hodge's plan,—During a pain, with two fingers, press upon the sinciput, flexion results and rotation is facilitated.

(3) Tarnier's plan,—Pass two fingers behind the ear of the baby, the other hand pushes on the forehead outside, while the two fingers pull the occiput forward.

(4) Failing in this, the half-hand may try the same maneuver, but where these succeed the case would perhaps have terminated itself.

(5) Author's method,—A combination of internal and external manipulations. Flex the head from below, then pull the occiput forward, both maneuvers with the hand in the vagina. From the abdomen first dislodge the shoulder by extending the child's body; then pull the breech down, so as to flex the axis of the fetus strongly; then pull the shoulder to the front by operating on the back. Hold what you have gained and repeat the manipulation if necessary. If the head, as is not uncommon, can be pushed up so as to allow the inside hand past the promontory to reach the shoulder, the fingers may swing the child's trunk around, so as to bring the back anterior. Now the occiput will remain anterior. CARE!

(6) It is not justifiable to rotate the head through an arc greater than one-fourth of a circle by means of the forceps, because the danger of laceration of the mother's soft parts is too great.

The operation of the forceps is very difficult and varies with the position of the occiput. When the occiput is in a position between the transverse diameter and the hollow of the sacrum, the forceps are applied in the transverse diameter of the pelvis and traction made in the horizontal plane, no attempt at rotation being practiced. If the occiput comes down, flexion is increased, and some anterior rotation occurs. If this is noticed the forceps are opened and re-applied. If, on the contrary, the occiput should show a tendency to rotate posteriorly, no attempt should be made to hinder this. To force the rotation into an anterior position would seldom succeed, and there is great danger of tearing the soft parts. Pull the head well into the pelvis before you try to aid rotation.

When the occiput is directly behind, i. e., in cases of posterior rotation of the occiput, the head must be delivered in flexion, if this is possible.

Forceps applied, as usual, but the concavity of the forceps, the "front," looks to the forehead, which from now becomes the "point of direction." Traction on the parietal bosses, a little upward from the horizontal plane. This causes flexion and it has happened that anterior rotation occurred even now. Deliver the occiput first. The forehead rests behind the pubis till the occiput is delivered over the perineum, then forehead, face and chin come under the pubis. Great danger of rupture of the perineum, therefore, episiotomy al-

ways in primiparae and in multiparae, if the perineum well preserved. Scanzoni's method of forceps seldom needed.

Forceps in Face Presentation—Face presentation is eutocia and almost always terminates spontaneously. Remember this:

(1) It requires much more patience.

(2) First stage is slower, second stage lasts seven hours.

(3) Anterior rotation of the chin takes a very long time.

(4) The head seems engaged long before the bi-parietal diameter has passed the inlet, owing to the length of the wedge.

(5) That the face does not rotate till it is well down on the perineum.

(6) That the chin must come to the front for labor to be completed. True of almost all cases in spontaneous labor, invariably for forceps cases.

Indications—Face presentation per se is no indication. Same indications as for extraction and forceps in general. But the indications must be *stricter*, especially the length of the labor. Insist on the conditions.

Conditions—Beside the usual conditions—

(1) Head engaged.

(2) Cervix dilated.

(3) No disproportion between head and pelvis.

(4) Bag of waters ruptured.

(5) Child living,—one new condition:

(6) The chin must not be behind the transverse diameter of the pelvis.

Preparations—Same as for ordinary forceps, but place the craniotomy instruments on to boil, in addition to the ordinary forceps.

Treatment—In the treatment of a case of face presentation, preserve the integrity of the bag of waters. Let woman lie for some hours on the side to which the chin points, and do not operate till the chin has rotated into, preferably, beyond the transverse diameter. Wait a long time because if the chin does not come to the front, craniotomy is almost the only alternative.

Operation—First, when the chin has rotated.

(I) Same application as in vertex.

(II) Adaptation different. Instead of depressing the handles, must raise them to, or above, the horizontal plane. This is to sink the blades into the hollow of the sacrum so as to bring them over the parietal bosses. If the blades are placed over the front, they will slip off from the narrow brow and neck; therefore, raise the handles, lock and then sink the handles.

(III) Traction much more carefully. First downward so as to deflex the chin. Traction in the horizontal plane till the chin is well out from the symphysis then upward, but not so acutely, over

the symphysis, as in vertex presentation. In primiparae, usually do episiotomy.

Operation—Second, when the chin is not fully rotated—

Delay operation as long as possible, because it is much harder, more delicate, and there is much greater liability to do injury to the mother and bring a dead child. If the child is dead, no forceps but craniotomy. In cases of doubt, give the child the benefit of the doubt.

(1) *Application*—Same as usual, but the blade that comes in the side where the face is, must be placed directly in position, because it must not pass over the face and neck in rotating it into place.

(2) *Adaptation*—Blades placed in an oblique angle to the facial line, i. e., in mento-dextro transverse, in right oblique, left blade to the front, right blade behind. See the danger,—face grasped from the chin to the forehead, compression of the neck; therefore, still births common.

Rule—Front of the forceps in direction of the point of direction (i. e., the chin).

(3) *Extraction and Rotation*—To be accomplished very slowly and gently. Unlock forceps frequently. Same principles as in deep transverse arrest of the occiput. Extract and rotate at the same time. Slowly.

Brow Presentation—Same rules as in face presentation operations. Here the brow must come to the front and appear in the vulva. Then bring the occiput over the perineum, and finally depress the handles to bring the face and chin from behind the pubis. Episiotomy in primiparae.

HIGH FORCEPS OPERATION.

Thus far we have considered forceps when the head was in the outlet, or at least, below the mid-plane. When the head has just passed the inlet it may become necessary to apply the forceps. On certain occasions there is some indication for forceps when the head is in the inlet, the bi-parietal diameter not having quite passed this plane. Here the head is so well fixed that it may be impossible to move it away to do a version, and yet it is not quite engaged so as to fulfil the condition for forceps. Under these circumstances the forceps is an instrument of trial, or, as Carl Braun said, "an instrument of diagnosis." We want to see if the head will come into the pelvis. If, after suitable trial, the head will not come in, must do a craniotomy, even if the child be alive.

Up to 1892 the mortality of the high forceps operation was 15%, but now, because of better selection of the cases and the making of stricter indications, the percentage is lower.

For this operation a special forceps is advised, the Axis Traction Forceps, i. e., one that will allow traction in the axis of the inlet.

The head, when high up, has a curve to traverse. Owing to the sacrum and perineum, traction cannot be applied in the axis of the inlet. If applied in any other line, the problem is like trying to pull an object around a corner, either the corner or the object suffers. Therefore, we want some instrument which will draw in a direction of the inlet's axis. Simplest would be a forceps shaped like the letter S. We have such instruments, but they are not very useful, because the head must have freedom to move the way it is forced by the factors of the mechanism of labor; therefore, we must have an instrument which will confer some degree of mobility to the head. In 1881, Tarnier introduced a forceps which fulfils these two conditions: 1st, it allows traction in the line of the axis of the inlet; and 2nd, it confers a certain degree of mobility on the head. Tarnier has modified his original instrument many times. His latest model can hardly be improved upon.

Indications for High Forceps—

(1) Head wedged in the inlet, too fast to be pushed up so as to do a version, and when you believe a slight pull will help it into the pelvis. This arises after a long labor and something indicates interference.

(2) Head has just passed the inlet but has not yet reached the mid-plane, and some indication arises to terminate labor, e. g., eclampsia, exhaustion, asphyxia of child, etc.

(3) Head not yet engaged, but, version being impossible, from one cause or another, high forceps must be tried before craniotomy; given, of course, an indication for delivery.

Conditions, which must be insisted upon, as the mortality is very high at best:

(1) Head must be engaged, or very near it. Sometimes a large caput succedaneum may reach low down in the pelvis and make one think the head is really lower than it is. In these cases, push finger along the side of the tumor, or try to massage it away. Remember the three criteria of engagement.

(2) Dilatation must be complete.

(3) Bag of waters must be ruptured.

(4) Pelvis not too contracted. In a generally contracted pelvis with a conjugata vera less than 8½ cm., almost impossible to bring a living child. Even with 9 cm., unless the child is small; hard operation. In the flat pelvis, the limit is 8 cm., conjugata vera. If the head is movable, do version. If fixed, forceps,—as a trial.

Preparation—Same as usual but insist on the table, because the operation is always difficult.

Operation—

(1) *Application*—Blades to be laid in the sides of the pelvis. With the head so high up the forceps must go deep in and then curves of forceps and pelvis must correspond. But the head is grasped in the antero-posterior diameter, since the head, when entering the pelvis, especially if it be a flat pelvis, comes in with the long axis of the head in the transverse diameter of the pelvis. This cannot be avoided, but to prevent serious compression of the head, do not press the handles of the forceps together, place the finger between the handles. Pass the half-hand high up inside the cervix and membranes. After blades are in position they are simply locked without any attempt at rotation, etc.

(2) *Adaptation*—Same rule as usual,—sink the forceps on the perineum, sink and twist, sink, push in and twist. These maneuvers are especially necessary here. Bring the handles as near to the perineum as possible. The blades may be felt from the outside and adaptation thus aided.

(3) *Extraction*—Same rules here as in ordinary forceps,—traction, intermittent, stationary, not to exceed 60 lbs., and with pains. Make eight tractions, if no palpable progress, remove the forceps and perform craniotomy, even if the child be living, or do symphysiotomy, if the condition of both patients is good. Traction first downward. If no progress, put the patient in the hanging or Walcher posture. Not justifiable to make more than eight powerful tractions, because of danger of cervico- and vesico-vaginal fistula.

If the head comes down into the pelvis there is a certain movement which is unmistakable. You may now remove the forceps, or loosen them. Rotation of the occiput to the front may now occur. If you see it occurring leave the forceps alone, so as not to interfere with the motion. After it has occurred, may take out the forceps and leave the case to nature, or terminate the labor with the axis traction forceps, or with ordinary forceps (Simpson).

Prognosis of the Forceps Operation—This operation is one of the bloodiest in all obstetrics. Some tears of the passages are inevitable and these increase in number and severity the higher up the forceps is done; therefore, the most in high forceps operations.

In the high operations, the cervix may be torn, especially if the condition relating to the cervix is not fulfilled. If rotary motions with the forceps are made, the vagina may be twisted from its connective tissue attachments, or the cervix may be caught in the grasp of the forceps and be bruised or torn off bodily; or the operator, thinking the blade is inside the cervix, may use force, and as the tip of the instrument is in the fornix, he may punch through this up under or through the peritoneum.

The vagina itself may be torn or cut by the blades of the for-

ceps, and the vulva also, especially when the forceps blades are bent upward in the delivery of the head, the edge may cut the crura of the clitoris and cause severe hemorrhage, or pressure necrosis which may go to the bone. In severe forceps operations the symphysis pubis has been ruptured, also the sacro-iliac articulations.

Vesico-vaginal fistula from compression of the bladder, or tearing by the blades. Perineal tears to and through the rectum. Hematoma vulvae.

Post-partum Hemorrhage—1. Atony uteri. 2. Cervix tears. To these are added the dangers of the slipping of the forceps. This happens in two ways, according to Mme. La Chapelle; in the horizontal sense, i. e., the forceps slide off in the direction of the line of traction; and in the vertical sense, i. e., the forceps slip off in a line perpendicular to the line of traction.

Causes—

(1) Head grasped too low down (think head engaged).
(2) Forceps feather too much.
(3) Do not compress enough.
(4) Head too small or too large, or not grasped properly, e. g., when forceps lie over the neck.
(5) When the head is at the outlet and you bend the handles up too soon.

The dangers of the slipping are great, especially laceration of the soft parts and injury to the head of the fetus.

You diagnose the slipping from the sensation of elastic resistance and seeing the handles tend to separate. If the forceps has slipped, can feel the sudden loss of resistance and may hear a snapping noise.

When the forceps slip in the horizontal, can feel the forceps come, but there is no feeling that the head moves.

The forceps slip off more easily when the head is at the inlet, since, in the pelvis the sides of the pelvis hold the forceps applied to the head. You must recognize the slipping early.

Treatment—Take off the forceps and re-apply. If too small head, get a smaller forceps. If hydrocephalus, puncture the head.

Dangers of Forceps for the Fetus Are—

(1) Compression of the head, slowing of the heart, asphyxia.
(2) Fracture of the skull, with or without subdural hemorrhage.
(3) Hemorrhage from rupture of the sinuses at the base.
(4) Crushing of the orbital plates, of the face, eyes, etc.
(5) Facial paralysis, from compression of the nerve as it comes out in front of the mastoid. Usually good prognosis.
(6) Pressure necrosis of the scalp, perhaps to the bone.
(7) Said that idiocy more frequent after forceps.
(8) Cephalhematoma. Usually good prognosis.

(9) Compression of the cord which is around the neck, and asphyxia.

Forceps operation has a higher death rate than normal labor; 8% for high forceps, for the child 15% to 20%. The forceps operation is never one of convenience, always one of necessity. Never operate to save mother pain, or to save your time, or to satisfy the clamor of her friends.

OPERATIONS CALCULATED TO CHANGE THE POSITION OF THE FETUS, OR ITS POSTURE.

Version—Version may be defined as the changing of a pathologic or relatively pathologic position of the fetus into a normal, or relatively normal position. The definition includes:

(1) Version from a transverse to a longitudinal presentation, either podalic or cephalic.

(2) Version from a cephalic to a podalic presentation.

(3) Version from a podalic to a cephalic presentation.

The first is always indicated, i. e., all cases of transverse presentation give an absolute indication for version. The others need special indications and conditions. These two terms may well be again defined as will use them so frequently.

An Indication—Is a state of affairs showing the need of a certain method of treatment, or interference. This treatment may be "watchful expectancy" or active operation.

Examples—Transverse presentation is an indication for version. Edema pulmonum, in the second stage of labor, for forceps.

A Condition is a state of affairs which governs the indication. It is a pre-requisite for the carrying out of any line of treatment. Sometimes this may be a contra-indication, other times it may be something that must be present or absent in order that the operation may be done.

"Contra-Indication" does not embrace all that "condition" does, while many conditions are really contra-indications. Examples of conditions are: In the transverse presentation a condition for version is that the uterus be not too contracted. In the forceps case,—the cervix must be dilated. A contra-indication to either operation is a too highly contracted pelvis.

Version in Transverse Presentation—We call transverse presentation all cases in which the long axis of the fetus crosses the long axis of the mother. A crossing at a right angle almost never occurs, as the head or the breech and, therefore, the shoulder lies over the inlet. We speak of shoulder presentation,—but the back may present, the side, or the abdomen. Transverse presentation is a little more frequent than face presentation—7/10 of 1%.

Note—For an exposition of the causes, mechanism, prognosis and diagnosis of transverse presentation, see third year notes, page 198.

Treatment—If you recognize the abnormal position during pregnancy. Version by posture. If persists for two weeks, external manipulation and a binder with pads to hold the child in the corrected position.

During labor version can be accomplished in three ways—

(1) By posture.

(2) By external manipulation.

(3) By combined external and internal manipulation.

Posture is useful only for cephalic version or to help either of the other forms of version. It is useful in the treatment of transverse presentation during pregnancy, and the first stage of labor, when it is often successful in changing the presentation. Put the patient on that side to which the head points. The breech then falls over to the side and the head goes down over the inlet. After this has been accomplished, retain in place by a well padded binder. Success not constant.

Cephalic Version in Transverse Presentation—In cases of transverse presentation, the indication lies in the production of a presentation that is most favorable to mother and child. Unquestionably this is the cephalic presentation, and we should do it when the following conditions are present:

(1) There should be no immediate or prospective indication for the rapid termination of labor.

(2) There must not be the least pelvic contraction.

(3) The fetus must be very freely movable; bag of waters intact; no pains or weak pains.

1. We gain little by version by the head if there is some indication to terminate labor, as we cannot do it, the head being high up and forceps not allowed.
2. If there is some pelvic contraction, we cannot expect the head to engage, unless late and some accident may happen during the version which may demand immediate extraction. We sometimes turn from cephalic presentation to pelvic presentation in contracted pelvis.
3. Version by the head in the absence of this condition is harder and often impossible.

Version by posture is the least dangerous and should be tried, even late in the first stage. You are almost always called to transverse presentations late, when the bag of waters is ruptured or when attempts at delivery have caused violent contractions, but if you have a case in pregnancy or in the beginning of labor, must try it. In cases where the head has just slid off to one side, resting in one

iliac fossa, this method is almost certain. If this does not do, or if you see that it will not, Wiegand's method. One hand over head, one over breech, and with alternate pushing and stroking movements, try to bring the head over the inlet. If accomplished, put patient on the side on which the head had been.

If the bag of waters has now completely dilated the cervix and os, and if no parts have prolapsed alongside the head, rupture the membranes. If these not present, keep the head over the inlet by posture. If neither method succeeds, we may try to turn by the combined internal and external procedure.

Wright's is a combined internal and external method.

Very few obstetricians now-a-days turn by the head by this method. If the cephalic version does not succeed by the given means, they turn by the feet; indeed, cephalic version in transverse presentation is more theoretical than practical (excepting in the oblique presentation), because: 1st, we are usually called too late; 2nd, there is usually a contracted pelvis, which contra-indicates the cephalic presentation, or some anomaly which makes the cephalic version more difficult than podalic version, and often one is so glad, in a given transverse presentation, that it is possible to turn by the feet, that a cephalic version is not considered, it being harder. The most frequent operation in transverse presentation is version by the feet, and it is this that is meant when we speak of turning or version, in transverse cases.

Review—Treatment of transverse presentation—

During pregnancy, version by posture, i. e., let the patient lie on that side on which the head lies (when in bed.) Keep this up for two weeks. If still persists—

Version by external manipulation.

Version during pregnancy means cephalic version and there must exist the three conditions which govern the procedure:

(1) Absence of any immediate or prospective indication for the rapid termination of labor.

(2) Presence of a high degree of mobility of the fetus, i. e., few, weak or no pains, bag of waters intact.

(3) Absence of the slightest pelvic contraction.

Of course, the first and second conditions are present during pregnancy. Under these conditions version almost always succeeds. But often the fetus takes its original position again.

During the first stage of labor, and even in the second stage, try external version and posture. We turn by the head if the three conditions are present.

We do *podalic version* in transverse presentation—

(1) When cephalic version has been tried and failed.

(2) When there is some immediate or prospective indication for the rapid termination of labor. These indications coming from the mother or fetus. From the mother, such as fever, exhaustion, hemorrhage. From the fetus, asphyxia, as shown by increase or slowing of the fetal heart tones, and escape of meconium with the liquor amnii, etc.

(3) When there is some pelvic contraction.

The methods are the same as in cephalic version, excepting "posture." This we cannot use, save to assist the other methods. External manipulation finds its greatest usefulness here, because it involves little trauma, and should be tried whenever possible. The procedure is the same as in cephalic version, but we strive to bring down the breech and force up the head. In a multipara, with intact bag of waters, often succeeds, but may not if strong pains are present. Operate between pains, holding at each uterine contraction that which you have gained. May even give an anesthetic. After the breech has been brought to the inlet, if the cervix is effaced and the os dilated, may rupture the bag of waters; if these two conditions not present, put the patient on the side from which you have brought the breech and wait. Should any indication now arise for the immediate termination of labor, you must go into the uterus with one hand and bring down a foot on which to extract. This is one of the objections to version by external manipulation and causes us often to wait till the parts are ready so that we can turn and extract at the same sitting.

In oblique breech presentation, i. e., where the breech has simply slid off to one side, in the iliac fossa, external manipulation almost always succeeds.

Third Method—Internal and External, or "Combined." When we speak of version in transverse presentation we mean internal version, and usually version with the bringing down of one foot.

There are two methods—

(1) Braxton Hick's method,—hand in vagina, two fingers in uterus.

(2) Version Proper,—whole hand in the uterus, aided by the outside hand.

Which of these methods is used depends on the condition of the cervix and the mobility of the fetus. If the cervix is completely dilated, you do version proper, rupturing the bag of waters, if necessary. If the cervix is not dilated and the bag of waters intact, wait; but do not go away, stay by the patient so as to interfere when needed. If the cervix will admit only two fingers, but the bag of waters be ruptured, do Braxton Hick's version. Do not wait after bag of waters is ruptured for the cervix to dilate to a size sufficient to allow the hand to pass through, but do Braxton Hick's version.

It will serve to present the subject more clearly if we consider version proper first, taking up Braxton Hick's method later.

Version Proper in Transverse Presentation—

Conditions—

(1) Cervix effaced, os dilated to admit the hand.

(2) Pelvis not too contracted, not less than 8 cm. in flat pelvis, and 8½ cm. in generally contracted. The author extracted a small child through a c. v. of 7½ cm., but not to be counted on unless it is positively known the child is small.

(3) Uterus must not be in tetanus or retracted over the fetus, i. e., no neglected transverse presentation.

(4) The fetus must be mobile, at least, easily displaced.

These conditions, however, must be stretched as far as is safe for the mother, since the alternatives are desperate, e. g., embryotomy or Caesarean Section.

(5) Under certain conditions the fetus must be living.

Preparations—

(1) Bladder and rectum empty.

(2) Patient on a table, on back. Do not operate in bed, in justice to yourself, the patient and the child.

(3) Antisepsis and asepsis, subjective and objective, extreme.

(4) Have everything ready for treating asphyxia of the fetus.

(5) Anesthetize the patient.

(6) Accurate diagnosis of presentation and position.

A. Which hand will you use?

Rule—Take the hand whose palm will be toward the breech when placed in the uterus; therefore, when the breech is to the right, the left hand,—when to the left, the right hand. Reason is plain.

B. *Bag of Waters*—What shall you do with the bag of waters should you be fortunate enough to get to do version before its rupture?

Three methods, according to three masters: Levret, Deleurye and Hueter.

Levret—Ruptures the bag of waters in the cervix and puts the hand inside the membranes.

Deleurye—Separates the membranes from the uterus till he reaches the level of the feet, then ruptures the bag of waters.

Hueter—Does like Deleuyre, but brings down the foot and then ruptures the bag of waters.

The first method is the one of election. Dangers of infection, air embolism and separation of the placenta attend the others.

C. Which foot shall you grasp,—or, shall you take two feet?

Turn on one foot.

Take lower foot in anterior and upper foot in posterior positions. Why?

Scapula Left Anterior (the most common)—Place the fingers of the left hand together, in the form of a cone, well lubricated with sterilized vaseline, or lysol, or 1:1000 bichloride in glycerine, and with a gentle, boring motion go through the vulva, vagina and cervix. Place the other hand on the uterus, to prevent its recession from the advancing hand. After the hand has gotten into the uterus (sink the elbow well, to get beyond the promontory of the sacrum), place the other hand over the extremities and force these against the internal hand. Pass the hand directly along the belly of the fetus to the extremities and grasp the under foot. This is the foot more easily reached. Be careful of the cord and do not bring down a hand. The points which mark the hand are: (1) the length of the fingers; (2) no heel; (3) round palm, while the foot is long; (4) great mobility of the wrist; (5) followed up you feel the elbow which is characteristic. If you should bring down a hand, put a sling on it.

Grasp the foot with two fingers over the malleoli, the thumb against the sole. Now while this hand pulls on the foot, the other pushes the head up in the opposite direction, working outside. Working together, between pains, rest during a contraction, the leg is finally brought down till the knee clears the vulva.

Direction of traction is first downward toward the sacrum, then outward. When the knee appears at the vulva the version is complete, i. e., the head is in the fundus. The extraction of the fetus may not follow, but had better wait. Extraction of the fetus is an operation for itself, and has its own indications and conditions. Watch the fetal heart tones. Danger of separating the placenta during version, shown by the signs of asphyxia of the child and the occurrence of hemorrhage; if these are present, proceed with the extraction.

There is another method of reaching the foot. That of Baudelocque. Pass the hand to the back and down the leg to the ankle. Rule in back anterior positions is to grasp the lower foot. Reason is that the back of the fetus is kept anteriorly, which is of great importance in the subsequent extraction. What shall you do with the hand if it be prolapsed?

Do not push it back into the uterus, because you gain nothing by the procedure and it generally falls out again. Place a sling around the wrist. The arm recedes as the version is being made, and later the tape may be used to extract the arm with. If the cord is prolapsed, or prolapses during the version, if it pulsates, good and well, wait; if not, extract quickly.

In certain cases the version does not succeed. The fetus will

not turn. In these cases pull away from the obstruction, see that the uterus is relaxed, force head up with outside hand. But if the waters have ruptured and escaped since a long time it may be impossible to turn. The reason is, that the shoulder is wedged in the inlet and by bringing down the foot the condition is not bettered. Can now use a procedure invented by Justine Sigmundine, a famous German midwife, called the "Double Manual": Put a sling around the foot and while pulling on this, push the shoulder up out of the pelvis with the other hand. If this should not succeed, bring down the second foot, and then do the double manual on the two feet.

A neglected transverse presentation is a most formidable case, since an attempt at version, or even the introduction of the hand may cause a rupture of the uterus.

Version in Scapula Dextra Anterior—This is the same, save that the right hand is used instead of the left hand. The lower foot is brought down, as before.

Rule—In all back anterior positions bring down the lower foot. In back posterior positions the upper foot.

Version in Scapula Dextra Posterior Position—Everything the same except that the operation is more difficult, especially the getting hold of the foot. These are anterior and one has to put the hand above the symphysis to reach them. This may be difficult; therefore, if cannot do it when patient is in the dorsal position, turn her to that side to which the feet are. Then you can get by the inlet and the foot usually falls into the hand. Grasp the upper, if possible, hand outside assists as before. Reason for grasping the upper foot is to enable the back to come anteriorly.

In extraction by the breech it is highly important that the back be anterior; therefore, in turning, turn so that the back comes to the front. In order to accomplish this you must turn the fetus on its long axis, which is done by grasping the upper foot. Do this whenever possible, though experience has shown that even if the lower foot be grasped, the labor will usually terminate with the correct rotation of the back. Do not waste too much time in hunting for the upper foot. (The term foot, means extremity.)

Rule as to which hand to use the same.

If, after putting the hand into the uterus, you find that you have made a mistake in the diagnosis, put in the other, after thorough sterilization.

You will need the double manual and bringing down the second foot in back posterior positions more than in the other.

The extraction and its difficulties were already considered, q. v.

Braxton Hick's Version—In cases where you are called to a transverse presentation after the bag of waters is ruptured, but when the

cervix is just large enough to admit two fingers, you perform this operation.

Do not wait for the cervix to be dilated by the pains so that you can introduce the hand, because the case may become a neglected transverse presentation under your eyes.

Conditions—They are the same as for version proper, but the cervix need be large enough for two fingers only. The mobility of the fetus must be greater.

The Preparations—These are the same as usual.

Scapula Laeva Anterior—The whole hand is passed into the vagina as before, but two fingers only, passed through the cervix. The shoulder is pushed up to the left, at the same time that the external hand pushes up the head to the left. This motion is continued till a knee is felt. To favor the descent of the breech you may press the feet toward the hand inside. After the knee can be seized by hooking the finger into the popliteal space, or one finger can extend the leg while the second, in the space, brings down the foot so that it can be grasped. By using the external hand powerfully this method will often succeed. Bring the foot out through the cervix into the vagina, if possible. If possible only to bring the breech over the inlet, place the woman on that side from which you have brought the breech and wait till the cervix will admit the extraction; or, if no indication to interfere, leave the case to nature.

Braxton Hick's Version is of special use in placenta previa cases. Here extraction must not follow the version.

Version in the other positions is done on the same principles. What is to be done if the cervix will admit but two fingers and Braxton Hick's version not successful?

Since the cause of the trouble is the premature rupture of the bag of waters, nothing is more rational than to replace the bag of waters as best we can. This is done by means of the colpeurynter. This is a soft rubber, pear-shaped bag, to which is attached a long rubber tube. After thorough sterilization (boiling 30 minutes in plain water), it is folded together and then connected with a Davidson syringe. Let it fill with a weak antiseptic solution. Remove all the air by holding the tube higher than the colpeurynter, then fold into as small a roll as possible, and, by means of a 10-inch forceps, pass it inside the cervix and membranes. Remove the forceps and fill the colpeurynter. When it is full place an artery forceps on the tube and bring it over one groin. The pains now usually improve, the shoulder is prevented from entering the pelvis, what liquor amnii is left is prevented from escaping, and the cervix is dilated by a soft body resembling very much the bag of waters. After the colpeurynter is expelled, the cervix will admit the hand, when version proper may be performed. This operation is called intra-

uterine colpeurysis, and has quite an extensive application; a fact that is not well enough recognized. Certainly, too little use is made of this useful instrument.

Cephalic Version in Breech Presentation—The indications to change a breech presentation into a cephalic presentation are very few. In general, it is bad practice. It was done by the ancient physicians because they thought breech presentations were very dangerous. Now it is seldom performed, because breech presentation is eutocia.

A single indication—An old primipara with a breech presentation. Here there is great danger of rupture of the perineum by the after-coming head, and further, the resistant soft parts may so impede the delivery that the child dies of asphyxia.

Conditions—Same as for cephalic version in transverse presentation: (1) Mobility of the fetus. (2) No pelvic contraction. (3) No indication for the termination of labor. Method practiced is by external manipulation.

Dangers are—Detachment of the placenta; coiling of the cord, and recurrence of the breech presentation. All things considered, cephalic version in breech presentation is very seldom performed. We have better means of handling such cases.

Pelvic Version in Cephalic Presentation—Since occipital presentations are eutocia, some special indication must exist that causes us to change a head presentation to a breech. But there are conditions where a head presentation is relatively pathologic, i. e., offers less chances for mother and child, or either, than a breech presentation.

Indications—Chief indication is pelvic contraction, and especially in contractions from 8 to 11 cm. in flat pelves, and 8½ to 10 cm. in generally contracted pelves. Simpson said that the head passes through the pelvis better when the head comes last than going first, owing to the different shape of the wedge. The plane that has to pass through the inlet is one drawn through the bi-parietal diameter. When the head precedes, the wedge is obtuse. When the head comes after the body, the wedge is more acute.

Aside from this there may be some diminution of the capacity of the head by the escape of cerebro-spinal fluid, after the body is born (head under pressure of the pains, body only the pressure of the air). Doubtful.

Aside from the theory, experience has proven that the head last comes through more easily. Experiment also on the cadaver shows that the head comes through more easily in this manner. Further, we have a good handle to forcibly extract the head (the body), and by pressure from the outside we can force the head past the constriction.

The question is, whether it is more dangerous to the mother to

force the head violently through the pelvis, or whether it is not better to wait till the pains have moulded the head so that it can pass through the inlet. This is the old argument between those who would do version and those who would pursue an expectant plan in labor, in contracted pelves.

The dangers attendant on a long labor where the pains force the hard head against the bony rim of the inlet for hours, and even days, are, compression necrosis of the uterine, vaginal and bladder-walls, fistulae and infection, and peritonitis after this; further, the prolonged compression may cause necrosis of the skin covering the skull and cranial necrosis, even fracture of the skull. Fracture of the skull may occur in breech extraction also.

Version under these conditions comes into competition with expectancy, and later, if the head does not engage, the axis-traction forceps, and is called *"Prophylactic Version."* Paré, 1585, recommended this procedure, also his pupil, Guillemeau. Symphysiotomy and Caesarean section also entering this field, since the infant mortality of the operation is high.

II. Abnormal presentation of the head, e. g., anterior and posterior parietal bone, or ear, presentation. These are usually due to a contracted pelvis. Great danger of rupture of the uterus in these cases.

III. Face presentations, with the chin persistently posterior. There are two methods of treatment, one to change to a vertex; the other, version and bringing down a foot.

IV. Prolapse of cord or extremities.

V. Placenta previa. Here we have the head presentation, a relatively pathologic one, in that the woman may die from hemorrhage, while, when the breech is in the lower uterine segment, it acts as a tampon, pressing the placenta against the uterine wall, and stopping the hemorrhage.

VI. Any condition of the mother or fetus which indicates the rapid termination of labor, when the conditions for the forceps operation are not present, e. g., engagement of the head.

Such emergencies are, heart disease, exhaustion, weakness of the powers of labor, eclampsia, etc.

On the part of the fetus: Threatened asphyxia in utero. We wish in these cases to get some hold on the fetus. Unless the head is in the pelvis, we cannot grasp it with the forceps, therefore, we turn and now can make the extraction by the feet.

Conditions—Same as for version from transverse presentation to breech. The cervix must admit two fingers for Braxton Hick's version and the hand for combined version. Uterus must not be in tetanus, or not near rupturing. Head must be movable, i. e., not engaged; pelvis roomy enough for the subsequent extraction.

Operation—We have again two methods: Braxton Hick's, and version proper. The same conditions influence us as in making the selection in transverse presentation:

We do Braxton Hick's Version when the mobility of the fetus is great and the cervix admits only two fingers.

We do Version Proper when the cervix admits the hand, and when the fetus is more fixed.

What foot will you bring down?

Rule—Always the anterior foot. Then the back will come anteriorly and the extraction be easy. If you bring down the posterior foot, the anterior buttock may catch on the symphysis and impede the extraction.

You proceed the same as in transverse presentation, but you pass the hand further into the uterus. Push the head up with the other hand. Version is generally easy, but it may be necessary to go in for the other foot, or use the *double manual*. First, push the head inward on the chest of the baby, this to make a round ball of the fetus, so that it will rotate more easily; then, when the foot is down, push up on the head, which straightens out the trunk.

Force to be Used—In all versions the force used should be the gentlest possible. The uterus may tear very easily, and if this is perceived the hand must be immediately withdrawn and another method of delivery chosen.

CHANGES IN THE POSTURE OF THE FETUS.

I. *Face Presentation*—

Some authors, especially the older ones, advised to change every face presentation to a vertex. Face presentation is eutocia. The majority will terminate spontaneously, but they require a long time. Under certain conditions you may change a face to a vertex presentation:

(1) When the chin remains persistently posteriorly, and the head be not engaged.

(2) When there is delay in labor, causing danger to the fetus or mother, the head not being engaged.

It is important to know these three facts:

1. That in face presentation, anterior rotation of the chin does not occur till late, i. e., till the chin is pressed well against the pelvic floor.

2. The head seems engaged long before the parietal bones have passed the inlet. This is owing to the long distance from the parietal bosses to the face, and short distance to the occiput.

(3) That labor in face presentation is very long and tedious

There are several methods of changing a face presentation to a vertex:

1. Baudelocque,—internal manipulation.
2. By external manipulation,—that of Schatz.
3. Thorn,—combined method, internal and external.
4. Author's method.

Baudelocque's Method—Consists in forcing up the chin and then pulling down the occiput with fingers in the lower uterine segment.

Schatz' Method—This consists in pulling the shoulders upward and backward, while the breech is forcibly pressed down toward the face. Hard to execute. Often unsuccessful.

Thorn's Method—Consists, 1st, in forcing up the chin, face and forehead, with a hand in the uterus, then with the external hand, the shoulder is pulled toward the back, so as to make the anterior surface of the fetus concave, while an assistant's hand pulls the breech to the side opposite to that to which you pull the shoulders. The head having been brought with the occiput presenting, put the woman on that side to which the occiput points and wait.

Author's Method—

(1) Inside hand pushes up and frees head and shoulder from grasp of uterus.

(2) Push up chin, and press down occiput from outside.

(3) Push shoulder and chest into concave shape *from inside uterus.*

(4) Force down breech and lead the flexed head into pelvis.

PROLAPSE OF ONE OR BOTH HANDS WITH THE HEAD.

This is usually due to contracted pelvis, a small fetus or a sudden escape of the liquor amnii. Often recognized only after the birth of the head, and then it may explain some delay in the second stage, or error of rotation. Finding hand alongside the head, while the latter is still high up, is not rare. As the labor goes on usually the hand is retracted or pushed aside from the advancing head. Real prolapse of the hand occurs once in 237 labors, about. Dead fetuses are likely to have this complication, because the tonicity of their muscles and joints is gone.

Treatment—

I. Before the bag of waters ruptures, while the head is still above the inlet. Posture—To that side on which the hand did not prolapse. Usually suffices.

II. After the bag of waters ruptures:

(1) If the arm has prolapsed and the head be not engaged, if the arm appears to prevent the engagement of the head, replace it by the hand, then force the head into the

pelvis with the outside hand. We replace because we do not know if there is room for both in the pelvis. If the reposition does not succeed, or if the arm falls down again, do podalic version, when the conditions are present.

(2) After the head is engaged, don't do anything, since there is room for both in the pelvis. Still, the increase in the size of presenting part makes labor in the second stage longer and sometimes anomalies in the rotation, therefore, forceps is more frequently necessary. In applying forceps, be careful that the blade does not grasp the arm between it and the head.

Errors in rotation and delay in labor depend largely on the hand that prolapses, and its relation to the point of direction, e. g. if in a L. O. A. position the posterior arm comes down it will aid rotation; if the anterior, will delay or prevent it. If the arm and cord prolapse, do version.

A rare anomaly in the posture of the fetus is when the arm is thrown back into the nape of the neck and lies across the inlet. The diagnosis is difficult, requiring the half-hand and the case is usually formidable. Treatment is to bring the arm into better position with the hand, under deep anesthesia.

Prolapse of the Foot Alongside the Head—Feet seldom come down with the head. If they do, they may cause delay in labor, necessitating forceps. If the feet prolapse at the inlet, and impede engagement, do podalic version, which is usually quite hard, while one would think the contrary. The "Double Manual" is generally needed.

PROLAPSE OF THE CORD.

Prolapse of the cord is a rare complication of labor. Occurs 1:400 cases, but no accurate statistics possible.

Cause—Anything which causes imperfect apposition of the lower uterine segment to the presenting part, or prevents engagement of the head. Thus, there is room alongside the part for the cord to prolapse. In normal head presentations the lower uterine segment is so well applied to the head that the cord has no room to prolapse. Such cases are—

(a) Contracted pelvis: Here the presenting part is not engaged in the pelvis, the lower uterine segment hangs on each side of it, and there is plenty of room for the cord to come down. Important factor, so when you see a prolapse of the cord in a primipara, there is usually a contracted pelvis.

(b) Malpositions of the head, e. g., face presentation, brow presentation, prolapse of a hand with the head.

(c) Breech and transverse presentations,—same reason.

(d) Hydramnion. Rupture of the bag of waters early in labor, head being high up, therefore, commoner in multiparae.

(e) Accident, rush of the waters while the head is high up.

(f) Low insertion of the placenta. Cord near os.

(g) Length of the cord has some influence, but even a very short cord may prolapse.

We speak of the forelying cord, when the cord is found before the head in an intact bag of waters. After rupture of the bag of waters we speak of prolapse,—whether the cord remains in the vagina or comes out of the vulva.

Dangers of Prolapse—

For the mother—None, save those which are incident to the conditions which caused the prolapse and those incident to operations which are undertaken in the favor of the child. Mortality, therefore, is very low.

For the child—The dangers are great. Danger of compression of the cord by the presenting part, against the pelvis, causing asphyxia (not inanition, as the time is too short). The cause of the asphyxia is the interruption of the circulation, the result of the compression. Formerly held that the cord, when lying outside the vulva, becomes cold, and, therefore, the fetus dies. This may cause difficulty in the circulation of the blood through the cord, in that the cold contracts the blood vessels; further, the patient may lie on the cord and kill her child. A practical hint here,—keep the cord in the vagina. 40% to 50% of children die in these cases; 80% die when left to nature.

Diagnosis—

1. Before rupture.

A careful examiner may find the pulsating cord in the bag of waters before the head. Go carefully to the side and high up, if there is suspicion, as sometimes a small knuckle hangs down the side of the head, which is important to know, if forceps is to be applied. Most often the diagnosis is made after rupture. Differentiate from velamentous insertion of cord and from cervical vessels pulsating.

2. After rupture.

Generally no difficulty, feel the cord in the vagina, or may see it outside the vulva. If it has stopped pulsating, more difficult to diagnose. Must remember that the pulsation may be absent for a short time, and still fetus be living. This is true, especially during a pain, so do not say the fetus is dead too hastily. Control by the auscultation.

Treatment—Prolapse of the cord has an importance varying greatly with the presentation. In transverse presentation it has lit-

tle importance; in breech, more; and the most in cephalic presentation, especially of the occiput. This is due to the varying pressure of the presenting part on the girdle of resistance; the greater the pressure, the greater the danger of asphyxia.

In Cephalic Presentation—We must accomplish one of two purposes: 1st, must free the circulation of the fetus; or, 2nd, must make it possible for the fetus to get air. In other words, we must place the cord where it will not be compressed, or we must extract the child.

I. In cases where the cord is felt in an intact bag of waters, replace by posture. Put the patient on that side on which the cord is not, or in the knee-chest posture. To relieve her, Trendelenberg posture. Retard the rupture of the bag of waters as long as possible; therefore, be careful in examining. Put in a colpeurynter. If a large coil of the cord is felt, and posture not successful, wait until the cervix is large enough to admit the hand, then the case is treated as under next heading. Do not leave patient.

II. Cases where the cord prolapses. Everything depends upon the cervix. If it is not dilated, it is a bad case, almost always the baby dies. In these cases, Braxton Hick's version, or replace by posture, by two fingers, or by means of a catheter with a stylet. Operation difficult and usually the cord falls down again. In these cases put the patient on that side to which the occiput does not point, so as to favor lateral displacement of the head and wait. Replace the cord in the cervix and put in Barnes' bag. Often fetus dies while you are waiting.

If the cervix will admit the hand we have two methods to choose from: 1st, *Reposition;* 2nd, *Version and Extraction.* Results are equally good; choose the easier in a given case. You must always turn and extract when there is (a) a face or brow presentation, or pathologic cephalic presentation, or a prolapse of the arm; or (b) any indication on the part of the mother or child which makes the immediate termination of labor desirable; (c) or where there is a contracted pelvis (frequently exists); (d) where reposition fails.

Reposition—This is carried out with three points in view:

1. Replace always in the knee-chest posture. If patient can not tolerate this, Trendelenberg posture.
2. Replace rapidly, even if there is some compression of the cord. Rupture the bag of waters after the hand is introduced.
3. Use the whole hand.

Force the head over the inlet with the outside hand, and turn the woman on that side to which the occiput lies, holding the hand still inside the uterus. Do not turn her on her back, because the cord will fall down again. May hang the cord over a knee.

Conditions for the reposition are:

1. The child must be living and in good condition.
2. The pelvis must not be contracted.
3. No indication for immediate termination of labor.

Version—This performed under usual conditions. It may not be necessary to perform extraction immediately. Control heart tones, feel the cord. Indication for immediate termination lies in threatened asphyxia of the child.

III. A group of cases where the head has engaged.

No reposition or version possible, therefore, rapid delivery. If child alive, forceps quickly. Sometimes delivery is spontaneous; which you aid by exhorting the woman to bear down strongly. If fetus dead, craniotomy. Sometimes called to a case when the cord is pulsating very faintly, or not at all. What to do? Remember to assure yourself that the fetal heart really has ceased beating, If it has only very recently stopped, or if it is pulsating weakly, justifiable to do a version and extraction. Must have favorable outlook for a live baby. If the child has evidently been dead for some time, you may leave the case to nature in a multipara, with normal pelvis; in a primipara, do a craniotomy, if delivery is indicated. Do not apply the forceps to a dead child, nor turn and extract a dead child (except under unusual conditions). Accurate diagnosis must be insisted on.

Prolapse of the cord in a breech presentation or footling—Seldom necessary to do anything. Wait for some indication. Extract if the conditions are present.

In *Transverse Presentation*—No change in the treatment. Replace cord in vagina, during preparations for version.

SUMMARY OF TREATMENT OF PROLAPSE OF THE CORD.

(1) Before Rupture of the bag of waters POSTURE—side, knee-chest, Trendelenburg. If not successful, wait till cervix admits the hand and replace, or do version.

(2) After Rupture of the bag of waters—

A. If cervix not large enough for extraction:
   1. Braxton Hick's Version.
   2. Reposition,—catheter, fingers.
   3. Put cord in cervix and then Barnes' Bag.

B. If cervix will admit whole hand, two methods:
   1. Replace the cord. Three points—Rapidly, knee-chest position, use whole hand.
   2. Version by the combined method, followed by ex-

traction if necessary. Version preferred when there is some other condition making breech presentation desirable.

(3) After Head Has Engaged—

Neither reposition nor version possible, therefore rapid delivery. If child is alive, forceps. If child is dead, leave case to nature, or craniotomy.

MUTILATING OPERATIONS ON THE CHILD.

Undertaken in favor of the mother:

The operations thus far discussed were operations undertaken in favor of the child and the mother. We now have to consider operations in favor of either, at the expense of the other.

First—Operations intended to deliver the mother with the least danger to her and with no regard to the child.

They may all be grouped under the general term Embryotomy, which means section of the fetus. But the term embryotomy has come to be used in a restricted sense, and is employed to designate operations on the trunk of the embryo.

Craniotomy is an operation which consists in opening the fetal head, the evacuation of the cerebral matter, and extraction by means of a large bone forceps or a sharp hook.

Perforation is the first step in the operation of craniotomy, but is sometimes applied to the whole operation.

Cranioclasis is the third step in the operation, and is also sometimes applied to the whole operation. The instrument, which is nothing more or less than a large, strong, especially constructed bone forceps, is called a cranioclast.

Cephalothrypsis is an operation in which the head is crushed by means of a powerful forceps, supplied with a compression screw, no perforation of the head being made. The instrument is called a cephalothryptor.

Decapitation means what it says—section of the neck, and is accomplished either by means of a blunt hook or a sickle-knife, or the ecraseur, or scissors.

Embryotomy is applied to decapitation, or to the section of the fetal trunk, to the opening of the body cavities.

Exenteration means disemboweling the fetus, to diminish the size of the trunk.

Brachiotomy means section of an arm.

Cleidotomy is an operation introduced by Phenomenoff in 1895. It is section of the clavicles, and used when the shoulders are too broad to pass, the head being delivered and the child dead. Recently recommended but not practiced by a French author for living child.

CRANIOTOMY.

The Indications for the Operation.

I. On the Dead Fetus—(a) When the child is dead, labor delayed and any indication for the rapid termination of labor arises, e. g., eclampsia, rupture of the uterus, threatened or occurred; edema of the lungs, etc. We must modify this statement in private practice, for sentimental reasons it may be necessary to employ the forceps, but if the conditions for forceps are not present, e. g., when there is a small cervix, contracted pelvis, or large baby, the best and quickest way of delivery is by craniotomy. Do not do a hard forceps operation or version for a dead child.

(b) When the child is dead, there being no indication for the rapid termination of labor. Here we want to deliver the mother with the least amount of injury, as there is nothing to be gained. In a primipara, I would advise a craniotomy. In a multipara, leave the case to nature. If a face presentation, or a brow, or anything that will cause tears of the parts, prefer the craniotomy. In hospital practice always do it, but in private practice have to be guided somewhat by the family, who will usually object to disfigurement of the body, or may ascribe the death to the operation. In cases of delay of the after-coming head when the child is dead, take plenty of time, or perforate.

Of course if there is any doubt about the life of the child, it must get the benefit of it.

II. When the child is living the indication is very much harder to place, and is very often dependent, not on therapeutic grounds, but on clinical experience, the acuteness of the accoucheur in prognosis, and often enough on religious prejudices.

(a) When the special disproportion is such that it is impossible to deliver the child without grave injuries to the mother, e. g., any tumor of the pelvis, contracted pelvis, large head of the fetus. When the pelvis is more than 8 cm. (i. e., the conjugata vera), version and extraction. When less than 6 cm. there is no alternative; must do a Caesarean section. When from 6 to 8 cm. three operations:

1. Craniotomy on the living child.
2. Caesarean section from the relative indication.
3. Symphysiotomy.

The decision is hard to make, and depends upon the condition of the patient, whether certain operations have been tried, and the surroundings.

Between Caesarean section and craniotomy, remember that the favorable time for the former is early in labor, before many examinations have been made and no operative attempts at delivery. After this time the prognosis is bad. Can do a craniotomy on this

child and induce premature labor on the next. Do not consider Caesarean section unless the child is in good condition, i. e., heart tones good, no meconium, etc. Remember that conception is not so likely to take place after Caesarean section.

If the woman wants children do craniotomy this time and premature labor on the next. Give her the question unvarnished. Mortality of craniotomy is near zero, whereas Caesarean section at least 5% and under the conditions usually met, up to 40%.

Symphysiotomy has a mortality of 12%, a like per cent of children die, there is danger of permanent disability, from non-union of the pubis, of incontinence of urine, and of chronic suppuration of the pelvic joints. Field of symphysiotomy is 6 to 8 cm. Under very favorable conditions, when the fetus is in good condition and not too large, I think symphysiotomy is justifiable. When severe operations have already been undertaken for the delivery of the child, the probability of a good result is bad for symphysiotomy, as it is for Caesarean section, and in these cases it is better to do a craniotomy. Call a consultation to protect yourself. It is not justifiable to wait in these cases till the child is dead, because here you would expose the patient to great dangers. If the head is fixed in the inlet, it is justifiable to try the forceps, i. e., high forceps, which is always an instrument of trial. If eight tractions are properly applied and there is no progress, do craniotomy. If while doing a forceps operation, the resistances met are greater than expected, so that it is impossible to get the child through without serious injury to the child and mother; if after attempting a version in cephalic presentation, for contracted pelvis, this be found impossible, may do a craniotomy. If the case is hopeless for the child, and the family desires Caesarean section, refuse the case. If the chances are excellent for the child and nearly as good for the mother, may recommend heartily the Caesarean section, but you will have to abide by the decision of the family, as they have the right to decide. May do the craniotomy under these conditions.

(b) Face presentation, when the chin is posterior, when time for changing to vertex, and for version has passed and some indication for the termination of labor arises.

A careful application of the forceps is to be made, but under no circumstances is this to be forced, because the dangers to the mother are too great and the fetus almost always dies, either during the labor, a few hours after from asphyxia, or in a few days from the injuries inflicted and atelectasis pulmonum.

Conditions—

(1) Head need not be engaged, better if fixed.

(2) Cervix effaced and os dilated sufficiently for the subsequent extraction—at least four fingers.

(3) Pelvis not too contracted, not less than 6 cm., because here you cannot get the child through.

(4) Bag of waters ruptured, easily procured.

Preparations same as for any obstetric operation. Anesthesia almost always necessary and desirable to spare woman's feelings.

The operation is divided into three steps:

I. *Perforation of the Head*—Accomplished by means of Martin's or Guyon's trephine. Some authors advise Naegelè's perforator, which is shaped like a glove stretcher, but with a cutting edge. A careful man can do no harm with the sharp instrument and it will usually suffice. Four fingers are passed inside the cervix and tips laid on the head. Point of the Naegelé instrument carefully passed along fingers to the head and sunk into the scalp. Examine to see that it lies well and no maternal tissue caught. Then with a firm, slightly boring motion, force the instrument through. Have someone fix the head from the outside or grasp the scalp with a stout vulsellum forceps. Better to go through a suture, if you find it handy, but the perforator goes quite easily through the bone. Now separate the blades after unlocking. Now lock the instrument, turn 90 degrees and open again, then lock and under the guidance of the fingers withdraw the instrument. The trephine is used in like manner under guidance of the fingers.

II. *Excerebration* By means of a long douche point break up the brain matter, letting a stream of ½% lysol run through at the same time. Be sure to break up the basal ganglia, because the child may live, perhaps days, if not done.

III. *Act of Extraction*—No hurry at all. If the parts are not dilated may leave the case to nature.

Instrument of election is the cranioclast, Braun's or the author's three-bladed instrument. Simply a large bone forceps, with a strong compression apparatus. Solid blade is passed inside the skull, if possible, into the spinal canal, the other blade passed, preferably, over the face, because it gets a better grasp here. Same rules as passing the forceps. After being passed, examine to see if anything beside the head is caught in the grasp of the instrument. Lock and screw together slowly. Screw down tightly. Now gently extract, using the same rules as in forceps, i. e., intermittent traction, stationary traction, in the direction of the axis of the inlet. Be careful that no splinters cut the vagina. Cover them with the fingers. If instrument tears our, reapply it, being sure that the blades are well down upon the head. The three-bladed instrument will not slip off.

In craniotomy in face presentation, the perforator is placed on the forehead, at the glabella, or through one eye. This is the easier. Otherwise the operation is the same as before. When perforating

the after-coming head, may go through the occipital bone, or under the chin, or, best of all, through the base of the skull, by way of the mouth, when the wound is hidden—an advantage. Operation is more difficult than otherwise.

Prognosis—Prognosis of the operation is good; in good hands, and with good condition of the woman, none should die.

DECAPITATION.

Rare operation, 1:10,000. Old as Hippocrates, who did it with a curved knife. He also did craniotomy on the living and dead child.

Indications—Most common:

(1) Neglected transverse presentation—

Great danger of rupture of the uterus, if you try to turn, therefore in all cases where the child is dead, do not try to do a version. If the child is alive, a gentle attempt at version, in deep anesthesia, may be made. Where the lower uterine segment is thinned out, the uterus drawn up over the child, the contraction ring at or above the navel, embryotomy.

(2) Twins interlocked—Some authors advise to do a decapitation on the first child. It may be necessary to deliver the second first; nature does it this way.

(3) Double monsters—

In general it is bad practice in cases of double monsters to cut off the part which is delivered. Better to turn the child still in utero and deliver the two side by side; but diagnosis hard and cases bad. See chapter on Teratology.

Conditions—

(1) Pelvis not too contracted, 6 cm. in flat, 6½ cm. in generally contracted pelvis.
(2) Cervix dilated at least for four fingers.
(3) Child dead or living? Usually is dead. Same arguments as for craniotomy. If mother desires, can do Caesarean section or symphysiotomy.

Preparations the same as for any severe obstetric operation.

Operation—Three acts:

(1) Separation of the head from the trunk.
(2) Delivery of the trunk.
(3) Delivery of the head.

I. Section of the neck is best accomplished by the dull hook of Carl Braun. There are many other methods but this is used mostly. Pass in that hand which will present its palmar side to the head. Put two fingers around the neck from behind, the thumb meets them from the front. Now pass the hook along the thumb, from the front over the neck, and sink it well into the soft parts. To facili-

tate the whole maneuver, pull down the arm, which brings the neck into reach, and you must have it fully in your grasp in order to do the operation right. Now turn the hook so that the knob goes toward the head, pulling down at the same time. One turn and you usually feel the neck break. Another bite and the soft parts are severed. Three bites are generally necessary. Ordinarily some of the last shreds must be cut with a scissors.

II. Extract the trunk by traction on the arm, which always or almost always succeeds, protecting the maternal structure from being torn by fragments of bone.

III. Extract the head by the finger in the mouth. If the pelvis is not contracted, use the forceps, but if any trouble at all, perforate the head and apply the cranioclast. Be careful that the broken vertebrae do not cut the vagina when coming out.

In cases of neglected transverse presentation where you cannot reach the neck for a decapitation, the operation to do is eventration or exenteration. Perforate the chest with heavy scissors or the perforator, make a large opening, the hand now pulls out as best it can all the entrails, first the chest cavities, then through the diaphragm to the liver and bowels. After the two cavities are emptied, may extract by pulling on the arm, by means of a hook or the cranioclast applied to the spinal column. Or the spine may be broken and the child doubled.

OPERATIONS IN FAVOR OF THE CHILD.

Involving mutilation of mother.

I. Those which open new passages for the child, e. g., Caesarean Section, Laparo-Elytrotomy.

II. Those which enlarge the existing passages, e. g., Symphysiotomy (bony pelvis); Hysterostomotomy (soft parts).

The distinction between operations in favor of mother and child cannot be so very sharply defined, because any operation with delivery as its object is in favor of the mother as well as the child, e. g., symphysiotomy. But we mean that this operation will give the child more chances, but gives the mother greater danger at the same time, in comparison with other operations which save the mother but kill the child.

Sectio Caesarea—Derives its name from cedere, to cut, and has no relation to Julius Caesar. The Talmud mentions the operation as "Jotze Dofan." The first authentic Caesarean section was by Trautman, in Wittenburg, 1610—hernia uteri gravidi. Operation has been described by Rousset, in 1581. He based his description on fifteen cases which he had done, but a careful examination shows that these may have been extra uterine pregnancies. The swine

gelder Nufer in Switzerland had done a similar operation on his own wife. Rousset placed the indications and described the operation, so that he is usually considered the father of the operation on the living.

Mortality was very high—sepsis; did not sew uterus; late forlorn cases. Not till 1882, when Sänger (died 1902) improved the methods, did Caesarean section get a place in obstetrics.

Method of Sanger

(a) Median abdominal and anterior uterine incision (still the best).
(b) Resection of the uterine wall.
(c) Accurate adaptation with buried and Lembert's peritoneal sutures.
(d) Extreme asepsis and antisepsis.
(e) Use of the temporary rubber ligature.
(f) Drainage of the uterus.

Great improvement came with this operation in the results, but later several of these items were found unnecessary, e. g., uterine drainage, Lembert's suture, resection of the uterine wall, and latterly even the use of the rubber ligature is being done away with and the hands used to compress the broad ligament at the sides of the uterus.

The abdominal incision was made in many places and directions, now only one used, in the linea alba. Same is true of the uterine incision. Now only two in general practice, the median anterior recommended by Sänger, and the transverse fundal cut, introduced by Fritsch. Has, in my opinion, little preference.

There are several operations under this caption:

1. Conservative Caesarean section.
2. Porro's operation, removal of the body of the uterus.
3. Section with total extirpation of the uterus.
4. Vaginal Caesarean section.

Indications—These are absolute and relative, the scope of the latter being enlarged lately, with the increasing safety of the operation.

The absolute indication for C. S. exists when the parturient canal is narrowed so much that a child, even reduced in size, cannot get through with safety to the mother. This means an available C. V. of 6 cm. or 6½ cm. This narrowing may be in the bony pelvis, e. g., flat and generally contracted pelves, exostoses, tumors, etc., and in the soft parts, e. g., stenosis of the cervix, vagina, neoplasms of the uterus or adnexae prolapsed into the way of the child.

If the patient has passed the twenty-eighth week, the time for induction of abortion is passed, so we must let her go to term and perform abdominal delivery. It is not good to induce labor and to do symphysiotomy, too, as has been advised.

If the woman is in labor there is no choice. Caesarean section is the only operation and often we extirpate the uterus also.

The *relative indication* exists when the choice lies between craniotomy on the living child and Caesarean section. This has almost always reference to contracted pelves though the relative indication can exist with other conditions, e. g., placenta previa (premature detachment of placenta). A pelvis with a C. V. between 6 and 8 cm. if flat, and 6½ and 8½ cm. if generally contracted, will very rarely allow a living child through, but one can easily mutilate the infant and get it to pass. The question is to be put to the family and all the facts and mortality percentages clearly laid open for consideration. The physician should not assume the responsibility alone, but he may, if the conditions of the case warrant it, urge them to allow the section to save the child.

Such conditions are—

(1) An uninfected parturient canal, i. e., few or no examinations and surely no operations attempted.
(2) Mother in good health to stand laparotomy.
(3) Labor not too prolonged, i. e., patient must not have been in hard labor more than 8 hours, or altogether more than 24 hours.
(4) Child must be in good condition. Under these circumstances the physician can conscientiously recommend the abdominal operation, if a man is on hand capable of doing laparotomies, and good facilities are to be had. But if they are not present, the patient's interests are better subserved if this child is sacrificed and the hope of premature labor or Caesarean section under ideal conditions is held out for the next pregnancy.

The relative indication may not be said always to exist in cases of placenta previa. A large percent, nearly 40, of the children are lost in these accidents, and to save them the abdominal delivery has been proposed. In case of placenta previa with closed and rigid os, near term, C. S. may occasionally be practiced, but usually our methods of delivery from below will suffice.

Caesarean section is not yet safe enough to be used solely to improve the chances of the child.

Eclampsia is given as another indication, but it has not yet obtained general recognition. Prolapsed cord and premature detachment of the placenta are proposed but not widely recognized indications for the operation. After the death of the mother the child should be delivered as rapidly as possible, and opening the abdomen is sometimes the quickest way, though in a multipara the genitals could be in a few moments enlarged so as to permit instant delivery.

Conditions—

1. For the absolute indication the size of the pelvis is fixed—C. V. less than 6 or 6½ cm., and it matters not whether the child lives or not, the operation is a necessity.

2. For the relative indication the child must be in prime condition.

3. It is better if the labor is begun and there is some dilatation of the cervix, but neither is necessary.

Preparations—The same as for any serious laparotomy, plus arrangements for treating asphyxia of the child.

Need four assistants—one anesthetizer, one assistant for the baby, one assistant is opposite you, and one hands instruments, needles (which should be all threaded beforehand) and sponges. Three pairs of clean hands only, all with perfect rubber gloves.

Incision occupies the middle two-quarters of a line drawn from the fundus to the pubis. Go slowly because the walls are thin and it is easy to cut directly into the uterus. Open abdomen full length of incision, bring uterus out of wound by the left horn, cover it with a large warm gauze pad. Unite the abdominal wall behind it temporarily with three large vulsellum forceps.

The assistant gets ready to grasp the broad ligaments near the base so as to control bleeding if it become too profuse, the knife makes a small cut in the median line of the uterus near the fundus, the scissors lengthen the wound to about 4½ inches. The membranes are now opened, the child is quickly extracted by the feet, or the head, if it is a breech presentation. The placenta now usually falls into the free cavity. The cord is clamped in two places, and cut between, the child handed to the assistant deputed for this work, and the operator massages the uterus briskly, aiding the separation of the placenta and membranes carefully determining that the uterus is clean. The uterus now contracts vigorously and the assistant removes his hands. The sutures are now placed, one layer continuous No. 2 catgut taking in muscle only, then an interrupted No. 2 chromatized catgut, ½ inch apart, through peritoneum to the first row. Then a fine careful peritoneal suture of finest catgut. Then the toilette of the peritoneum and closing of the abdominal wall. Omentum drawn behind uterus.

Sometimes the uterus bleeds. Massage and compression with hot towels, ergot hypodermic, hot douche, uterine tampon, remove uterus.

After treatment same as any laparotomy.

The child is often in a condition of apnea, but recovers under the usual treatment.

Prognosis—In America, according to Harris, the general mortality is still 40%, but in the hands of skilled operators it is as low as 3%. These are selected cases, as Leopold, 3%. Dangers are shock, hemorrhage and sepsis. For general purposes we can say 10% is the usual mortality. In 8 favorable cases the author had no mortality. In one primarily unfavorable case the mother succumbed.

Child—If the child is healthy before the operation, ought to be

born alive, but nevertheless, mortality was formerly 25%, still 5%. Therefore the operation is still very serious for both.

Later Effects—Hernia abdominalis. Utero-abdominal fistula—one case where fetus made exit here. Adhesion of uterus to abdominal wall—tendency to abortion. Subsequent Caesarean section, no opening of peritoneal cavity. Ruptura Uteri: Not observed so often now since uterus has been sewed. Uterus heals so well that sometimes cannot see scar. Muscle fibres develop in it. Silk encapsulated and absorbed or discharged in about two years.

Effect on Subsequent Pregnancy—Latest statistics much better than old: 23%, and even in Chrobak's clinic 43%. Clinical observation that conception not so frequent as after operations per natural passages.

Operation of Porro—In 1877 Porro, of Pavia, devised an operation to do away with hemorrhage and sepsis. After removing child, he amputated the fundus of the uterus and the adnexae, with extra-peritoneal treatment of the stump. This for some time seemed to replace Caesarean section because it gave a better prognosis, but after Sanger it has been limited.

Indications—

1. Myoma uteri.
2. Osteomalacia.
3. Sepsis, uterine.
4. Great hemorrhage at Caesarean section.
5. Ruptured uterus, torn too much or with sepsis.
6. Carcinoma with stenosis of the cervix.

No conditions. Operate at any time, when indication is plain.

Operation—Same as Caesarean section till after placenta is removed. Broad ligaments ligated. Uterus amputated above ligatures, then treat stump either intra or extra-peritoneally. Mortality formerly better than Caesarean section, but now worse. Only done under express indications. In some cases the uterus is removed in toto, and the vagina sewed together, then the peritoneum roofs over the pelvis. Done in cases where there are fibroids, or sepsis, or malignant tumors, etc.

Laparo Elytrotomy—Incision parallel to Poupart's ligament. Dissect peritoneum. Incise cervix and lower uterine segment. Merely of historical interest.

Sectio Caesarea on Dead or Dying—Child lives 6 to 15 minutes after death of the mother. Once it lived 1½ hours. Depends on rapidity of death. Only 1½ to 2% of children saved. Mother uses child's oxygen. Fetus suffers first. If death by accident, 5 to 6 % saved. Old Jewish law in the Talmud and Catholic law, should do Caesarean section on dying woman, but it is hard to get consent of the friends; and then there may be a mistake in diagnosis—Strass-

burg, case mitral disease, cataleptic woman came to life again. Operation same as on living woman and as carefully.

Vaginal Caesarean Section—Duhrssen, in 1896, proposed this operation. It consists of an anterior colpotomy, then open the uterus longitudinally; extract the child, sew up uterus and vaginal incisions, with or without drainage.

Recommended for cases where, the pelvis being normal, there is an indication for rapid delivery at a time when the cervix is not effaced, e. g., eclampsia. Also for stenosis of the cervix from any cause. Operation is not hard to carry out. There is often great hemorrhage. and it requires skill, more than for the abdominal method.

Is very slowly obtaining a place in obstetrics, but the need for it will be a rare one.

SYMPHYSIOTOMY AND PUBIOTOMY.

Certain operations have the enlargement of the bony pelvis as their aim. Of these the most commonly practiced is symphysiotomy. This operation has had a very interesting history.

It was devised by Signault, of Paris, in 1773, when he was a medical student, and he obtained a prize from the Academy of Medicine for the thesis. He practiced it in 1777 for the first time, on the woman Souchot, the wife of a soldier. She had a urinary fistula, but finally recovered and the child lived also.

The next three operations were all fatal and the obstetricians of the time raised a great clamor against symphysiotomy. Baudelocque, La Chapelle, Du Bois, Cazeau, were among the opponents, though the last named said it might be successful in some cases, but never did it. It disappeared in France very soon, but took refuge in Italy and has been practiced there more or less since. The School of Naples has kept it up especially, through the efforts of Galbiati and Morisani. The latter worked long and hard to obtain for it public recognition, but he could not get this till his results improved, which came with the advent of antisepsis. In 1891 Spinelli, an old assistant of Morisani, went to Paris and called the attention of Pinard to the operation. Pinard took it up with characteristic French enthusiasm and within a year had done 17 operations. As a result of the experiments of Pinard, after separation of the pubic bones of 1 cm. there is an increase of the conjugata vera of 2 or 2½ mm. The increase of the separation of each centimeter means an increase of 2½ mm., but after the third cm. of separation there is an increase of 3 mm. According to Pinard, the increase is greater in contracted pelves and greater the more the pelvis is contracted. The increase is in all the diameters, in the outlet as well as the inlet. The transverse diameter enlarges one-half as much as the bones

separate, the bi-ischiatic about three-quarters as much as the symphysis separation. The extent of the enlargement of the diameters depends entirely on the movability of the sacro-iliac joints. During pregnancy the joints soften and allow much greater separation of their surfaces, without the rupture of the capsules.

Indications—Principally pelvic contraction, and as a substitute for craniotomy on the living child, and Caesarean section from the relative indication. The limits are 7 to 8 cm. or 8½ cm. in a generally contracted, or where the child seems very large. Very few operators allow a C. V. of less than 7 cm. The operation thus encroaches on the field occupied by three other procedures:

1st. Version and extraction. This should not be done in a pelvis of less than 8 cm., unless the child is known to be small.

2nd. Craniotomy of the living child, as a primary operation. After labor has been in progress for some time and infection taken place, or the maternal tissues bruised and the child in poor condition, the outlook for symphysiotomy is bad.

3rd. Caesarean section under the relative indication as a primary operation. In the same conditions as just enumerated, the outlook for Caesarean section is bad and one, therefore, usually prefers craniotomy.

If the woman should come to you during pregnancy, the question of the induction of premature labor comes up. The German school advises premature labor. Dr. Jaggard was also of this opinion. Pinard and the French school in general advise symphysiotomy. The maternal mortality of premature labor is about ½%. The mortality of the children is higher, fully 25% die either in labor or in the first few weeks after it. Decision is difficult and requires consideration of many conditions and much experience.

Other indications for symphysiotomy are: Face presentations with the chin immovably posteriorly. This is not a rational procedure and has found very limited acceptance.

Conditions—

(1) Os dilated (for the subsequent extraction).

(2) Pelvis not too contracted, not anchylotic at sacro-iliac joint. If less than 6 7-10 cm. no outlook for a good result, either for mother or child.

(3) If the bag of waters is not ruptured it is better.

(4) Child must be living and in good condition.

(5) Mother must be in good condition, not infected.

Preparations—Same as for any serious operation. Need at least three assistants. One for each leg, one for anaesthetic. If possible, have some one who will deliver the child while you attend to the operation. This is to avoid having the same hands getting into

the wound that go in the vagina. May use gloves for this part of the work, or use two pairs. Pubis shaved and abdomen with upper part of thighs scrubbed with soap and hot water, then alcohol, then bichloride 1:1,000; cover with a towel wrung out of bichloride while making the other preparations. Vulva scrubbed likewise. Vaginal douche and scrubbing with 1% lysol, which must include the cervix.

An accurate diagnosis of the pelvis, of the presentation and position. Examine the pubis, its thickness and the position of the clitoris and urethra, so as to be able to avoid them during the operation.

Operation—Incision in the median line, from a little above the pubis down to within a cm. of the clitoris, off to the left side of this. Bare the bone; finger from above goes behind the joint, pushing up the head if necessary. With a strong scalpel the joint is opened from before backward, the finger preventing injury of the bladder. The assistant holds the bladder to the side with a catheter. The legs are held tight, or the pelvis supported so that the opening of the joint be not too sudden. There is a characteristic noise as the joint opens. Now hemorrhage occurs from the large venous plexuses around the urethra, vagina and bladder. May be controlled by packing with hot iodoform gauze. Allow the joint to separate 6½ cm. to 7 cm. The deep perineal fascia is put on the stretch, as it passes between the pubic rami. Through it pass the urethra, corpora cavernosa, the vagina, large veins and plexuses. As the bones separate the fascia may tear. Results are hemorrhage and permanent injury to the structures, vesico-vaginal fistula, incontinence of urine. To avoid this try Harris' procedure.

Fatal cases of hemorrhage from the veins are recorded and are often enough in this locality to make one very careful. Treat the hemorrhage by ligation, cautery, but best of all, by the packing with hot iodoform gauze. After hemorrhage has stopped, or before if necessary, deliver the child. If the head is engaged, forceps; if still movable, version and extraction. After head is in the pelvis, bring the ends of the pubic bones together by bringing the thighs together. This relaxes the stretched pelvic fascia and prevents tears of the vagina. Delivery as usual. Placenta expressed by Credè. If any perineal tears, they should be attended to.

Now sterilize the hands again or new gloves, and remove the packing from the pubic wound; hemorrhage almost always has ceased. See that nothing is caught between the ends of the pubic bones, while the assistants bring the thighs together and press the sides of the hips.

Four sutures are passed, taking in fat and periosteum, silk, buried. Superficial silkgut sutures close the wound. No drainage necessary. Large occlusive dressing. Some accouchers use no deep sutures.

After Treatment—Of great importance. Tight pelvic band or

girdle, adhesive straps. Absolute rest in bed. In a case of spontaneous rupture of the pubis I used a square iron frame fitted with cloth straps and raised by pulleys in the ceiling, for bowel movements, urinations and dressings. Dressing changed if soiled. Pads changed frequently. No douches. See "Obstetrics for Nurses."

Prognosis—Mortality in America has been 14%. In Europe that of certain operators has been less than 3%, but if all the cases were reckoned, no doubt there would be the same mortality as in America. Statistics thus are unreliable. For children, between 8 and 15%. Not as good, by any means, as Caesarean section. Zweifel had 46 cases, with 3 deaths. Later results are—

(1) Sepsis, usually the operator's fault, but may be infected from infected genitalia.
(2) Fistula. Not very rare.
(3) Incontinence of urine. Generally transitory but sometimes permanent, or present only when the patient stoops or lifts a heavy load.
(4) Difficulty in walking. Pinard says it is a chimera. Experience in Vienna not so favorable, still it is feared too much.
(5) Subsequent conceptions and confinements usually normal, but the patient may need symphysiotomy again. In a few cases pelvis was permanently enlarged. Reminds one of Ollier's treatment, to do symphysiotomy in pregnancy, to avoid trouble in the coming labor.

In general it may be said, do this serious operation only under the strictest indication. Gigli invented the operation of pubiotomy. Done subcutaneously by means of his wire saw, introduced around the pubis by means of a curved needle. Section of the bone alongside Symphysis. Better results claimed for it than older operation.

INDUCTION OF PREMATURE LABOR.

This means the artificial induction of labor after the fetus is viable, but before term. The induction of abortion and premature labor has been done criminally from time immemorial, but the induction of premature labor for pelvic contraction is comparatively recent. The main indication is pelvic contraction, but there are several others. The first introduction of the operation is by Louise Bourgoise, midwife to Mary of Medicis, in 1608 (Pinard, Annal de Gyn., 1902).

Conditions—

I. Child must be *living* and *viable*. This must determine the time of the induction of premature labor. Before the 28th week there is very little outlook for a living child. Before the 32nd week the majority of children die, after the 32nd to the 36th the prognosis is good. But now the fetal skull is nearly as large as it is at term and little is gained. Best time is from the 32nd

to the 35th week. Further, the child must be living. If the fetus is dead this is a contra-indication to the induction of labor because it will occur itself in a few days. How to diagnose the time. Four methods:

1. Menstruation. Count back 3 months and add 7 days.
2. Time of one coitus, 280 days from this date.
3. Mensuration—pelvimeter, hand. Size of the child.
4. Müller's procedure—fitting head to pelvis.

The time of the last menstruation is an uncertain guide and further, is not always known. The date of the impregnating coitus is usually unknown and when given allows only relatively exact deductions. The best guide is the mensuration of the fetal body, next to which comes Müller's procedure. We measure the head and also the trunk. Cephalometry is a valuable addition to our knowledge, and with a little experience is easily practiced. One may use the cephalometer (of which that of Perret is a good one) or an ordinary pelvimeter.

The head is grasped by the hands through the abdominal wall and while so held is measured. Knowing the presentation and position we can judge in which diameter the head is measured and then deduce the others. Then it is sometimes possible to measure the head through a vertical diameter by placing one blade of the calipers in the vagina. If it is a breech presentation it is usually easy to measure the head in the epigastrum.

The length of the fetal body is gotten by putting one end of the pelvimeter on the breech and the other on the head through the vagina. Double this to get the length of the fetus, subtract two for the thickness of the walls, divide by five to get the month of gestation.

An experienced hand can guess the size of the fetus often within a few ounces and also judge the viability of the infant.

Müller's procedure consists in forcing the head into the pelvis from without, at the end of each week from the 7th month on. When you find that the head will not enter the pelvis, induce labor.

In a general way, the size of the uterus, the size of the mother, the history of large children, the father's size, the hardness of the head, etc., give more or

less information. It requires much study of each case and much experience to guard against mistakes. The facilities for caring for the child afterward have something to do with it. One is encouraged to interfere earlier if incubators and good nursing are to be had.

II. The mother must be in good health or relatively so. Do not induce labor on a dying woman.

III. Degree of pelvic contraction not too great. Below 7 cm. in a flat pelvis and 7½ in generally contracted, not safe to induce labor. Unless abortion is done in the early months, the patient must go to term and then Caesarean section or craniotomy on the living child. A. C. V. of 7 cm. offers bad chances for the child, even if labor induced in the 32nd week.

IV. Consent of the mother.

V. Consultation. Fallacies of human judgment and the great responsibilities assumed, demand this.

Indications—

1. Contracted pelvis.
2. Diseases which are peculiar to pregnancy.
3. Diseases which are accidental to pregnancy.
4. Habitual death of the fetus after viability but before term (rare).

1. *Contracted Pelvis—*

In pelves from 7 to 8 cm. indication is for premature labor, to avoid craniotomy on the living child, or Caesarean section, from the relative indication. Now symphysiotomy has encroached on this indicaton and has made the problem still more difficult. Pinard says that there is no more use for premature labor in contracted pelvis, now that symphysiotomy is here. Some authors have advised to induce premature labor and then perform symphysiotomy also, in cases of absolute pelvic contraction, i. e., less than 6½ cm., in order to avoid Caesarean section. The advice is not good because the mortality of symphysiotomy is high, with that of premature labor, very high, and the outlook for the child very bad. It can not be denied that the prognosis for the child in premature labor for contracted pelvis is bad. Between the 32nd and 36th weeks the average bi-parietal diameter is 8 7-10 cm. From the 36th to the 40th week 8 9-10 cm. About the 30th week it is 8 1-10 cm. The gain therefore is small.

The chances of compression in a pelvis 7 to 8 cm. are great, but the head is softer, usually, and more easily moulded. The best results are obtained when the contraction is from 8 to 9 cm., in cases where a craniotomy was done in a previous labor. But just this is the field claimed by symphysiotomy.

Other conditions must be considered: 1. Exostoses. 2. Pelvic exudations, tumors, especially retrocervical fibroids. 3, Very large child—patient has a history of large children. May sacrifice one child, premature labor on the next.

One point to be considered; that primiparae stand labor in a moderately contracted pelvis better than multiparae, because: 1, Pains are stronger in primiparae. 2, Children generally smaller and softer. 3, Pathologic presentations not so common.

If a woman has a contracted pelvis of 8 cm., two plans may be proposed—Caesarean section at term, and induced labor; usually latter selected. If a woman has had craniotomy at term, she will usually demand premature labor in next pregnancy, but may be prevailed on to submit to Caesarean section at term, under ideal conditions, as competent operator, good hospital facilities and nursing.

2. *Diseases Incident to Pregnancy*—In which the life of the mother is endangered by the continuance of the condition.

a. Eclampsia—Opinions are divided. Formerly, a purely expectant treatment till the attacks passed over, then induce labor or tide over to term. Then, all cases to be terminated at once. Now a middle position is assumed, although the majority of accoucheurs advise the rapid termination of pregnancy but with more mild measures than were formerly employed. (See chapter on Eclampsia.)

b. Bright's Disease—When there is a progressive increase of dangerous symptoms, e. g., edema, dyspnea, uremic symptoms. If careful treatment has no effect, indication is absolute.

c. Placenta Previa—There is no expectant treatment for placenta previa. Remain by the patient till she is delivered and out of danger. Induce labor. Still, in some cases, when hemorrhage is insignificant and where *patient is in a hospital*, it may be possible to temporize. In general, the above rule holds good.

d. Chorea—Aggravated by pregnancy, may be fatal; premature labor may occur spontaneously, nature showing the way to heal these cases. Still, premature labor does not cure all cases.

e. Pernicious Anemia—Quite rare, and results not encouraging.

f. Vomiting—The uncontrollable vomiting of pregnancy sometimes persists after the child is viable, but usually the question is whether or not to induce abortion. Same arguments as when the case comes earlier.

g. Toxemia of Pregnancy—This may show itself as hyperemesis or a state resembling typhoid.

3. *Accidental Diseases*—May endanger the life of the woman so that she dies before the termination of pregnancy. May be necessary to spare the woman the danger of labor or to avoid Caesarean section on the dead or moribund woman—e. g., Tuberculosis, Emphysema, Heart Disease; Carcinoma Cervicis does not offer an indication for premature labor. It is justifiable to do a Porro operation or a complete extirpation of the uterus. Appendicitis no indication. Treat it as usual.

4. *Habitual Death of the Fetus After Viability but Before Term*—It is hard to find a cause of death in these cases. But syphilis is most common. After this, Bright's disease, or profound anemia or other blood states or nutritional disorders. Finally, no cause may be determinable. This indication is legitimate, but there are two conditions:

1. Must know the exact time in which the fetus generally dies.
2. Must shut out syphilis. Treat the mother, she usually carries to term.

This is a very difficult question to solve, and still harder to determine upon inducing labor.

Methods—A large number have been used, thus showing that they are both inefficient and dangerous. The oldest is probably the rupture of the bag of waters. At present three methods are in use, and the employment of each is governed by the time at hand, and by individual preferences.

1. Bougies—The use of bougies in the uterus. Krause's method. Rubber bougies, not catheters, about 16 English. Sterilize the vulva, vagina and cervix. Soap and water. Danger of carrying infective material into the uterus. Bougies are sterilized by boiling. Passed in a speculum after most careful disinfection of the hands. Gloves. The bougie is passed to the side and behind, in the direction of the least resistance. Pass two, one to either side, till the end of the bougie rests on the posterior vaginal wall. Pack with gauze.

Dangers of this method—(1) Sepsis; (2) Introduction of air; (3) Placental site may be encroached on; (4) Bag of waters is frequently punctured; (5) Necrosis of the uterine wall in the path of the bougie.

This method brings on labor in that the bougies acting as a foreign body cause pains. Labor is natural, because the bag of waters is generally intact. Labor comes on in 24 hours in three-fourths of the cases; but sometimes have to wait a week. Do not persist after 48 hours. A certain amount of separation of the membranes from the uterine wall takes place. This is one of the causes of the pains.

2. Puncture of the bag of waters (oldest method)—Puncture with a sound, over the internal os. Various instruments. Carl

Braun used a goose-quill. Pass any pointed instrument under cover of the finger. I generally use the scissors. Most effective method we have and there is no danger, but the objections are that it causes a dry labor. Cervix may be torn, head of the fetus suffers too much pressure, especially in primiparae. In multiparae no importance. This method is to be preferred in cases of eclampsia, hydramnion, heart disease, almost always in placenta previa. May be used to hasten labor in selected cases.

2. Dilatation of the Cervix—This procedure is often used to hasten labor, but hydrostatic dilatation of the cervix is an effective method of inducing and completing labor. Barnes' bags in the cervix. Same precautions as before. Pass bag No. 1 first, then No. 2, then No. 3. If labor in progress, wait. If not, may now do the operation known as intra-uterine colpeurysis. Carl Braun's bag placed in the lower uterine segment, then filled with Davidson syringe. After filled may be dragged down. I often use a small bag, shaped like a colpeurynter. They were formerly used for air pessaries. Traction of one pound. New instrument, Bag of Champetier de Ribes. More powerful than Carl Braun's. Not much better. Everything used in this procedure is to be sterilized by boiling,—Davidson syringe, bags, etc.

This is an invaluable method and the cervix of even a primipara may often be so dilated in two hours as to enable delivery to be completed, e. g., eclampsia, placenta previa. May be used as an aid to labor, or to the other methods. If cervix is rigid, bags not so efficient.

Other Methods—Mentioned only to be condemned.

(1) Trocar. Bag of waters punctured high up. Obsolete.

(2) Intra-uterine injection of water, glycerine. Dangerous.

(3) Kiwisch douche. Hot water against the cervix. Dangerous.

(4) Colpeurysis of the vagina. Inefficient alone. May be used as an aid to other treatment.

(5) CO_2, water irrigations of vagina. Fatal embolism.

(6) Electricity. Inefficient alone, may aid other methods.

(7) Irritants to breast. Unhandy, inefficient.

Prognosis—Good. Not one should die from the operation. Sometimes die from the condition which indicated it.

For the fetus, not so good; 30% perish, but now, since the use of the incubator is known, better prognosis. Before the 32nd week the large majority of the children die.

After this the prognosis improves as the time lengthens. The severity of the labor or the operation necessary to complete it, also the skill of the operator, have much to do with the results.

It has been proposed to diet the mother to make the child smaller. Prochownik's plan of diet. Two cases in which the patient went to term and children were spontaneously delivered and lived, but

although well developed, were lean. Some women think that by limiting the salt-containing foods they make the children softer.

ARTIFICIAL INDUCTION OF ABORTION.

This operation is rarely indicated. It means the interruption of pregnancy before the 28th week. There are a few conditions which justify the operation. The conditions are similar to those for premature labor, i. e., the woman must not be moribund. You must insist on council, consent of the mother and the husband. Avoid the slightest appearance of mystery and secrecy.

Indications—

(1) Contracted pelvis below 6 cm. when patient refuses to allow the Caesarean section at term. Give woman the points. Give her the mortality rates. She will generally decide on abortion, but not always, the love of offspring being sometimes too strong.

(2) Cases of incarceration of the retroflexed gravid uterus, when attempts at reposition have failed. Very rare.

(3) Acute Hydramnion. Hydatidiform degeneration of the chorionic villi, when the diagnosis is made. Do not wait if there is any suspicion that the growth has become malignant.

(4)The uncontrollable vomiting of pregnancy: Here there is great play for individual opinion. The number of cases needing this operation is decreasing, since we have better methods of treating the disease. If the case is seen early and if the diagnosis is made, the prognosis without abortion is good. The condition is sometimes given as an excuse for performing an abortion on a woman who wants no children. You will not be long in practice before you will be approached in a hundred different ways, to perform abortions. Not alone the single woman but also the married will come. The former are to be pitied, the latter are to be shamed. All arguments are brought to bear on you,—gold, disgrace, no more children, etc. Under no circumstances allow yourself to be influenced, because: (1) It is murder and your conscience will not rest; (2) It is a criminal offense; (3) If you do it on one, she will tell her friends and soon you will have the reputation of being an abortionist. These are not all of the reasons, but the first is enough alone.

(5) Rapidly advancing tuberculosis; progressive heart disease; progressive renal disease (rare).

(6) Hemorrhage—Persistent hemorrhage, sometimes due to a dead ovum, or to a tedious abortion or placenta previa, or to placenta marginata. Hemorrhage persists for weeks, and you have to step in, to save the woman's health. Seldom she will carry safely to term.

Methods—Abortion is harder to induce than premature labor. It

is harder to procure complete separation of the membranes and placenta; further, the uterine contractions are not regular. It is easier after the sixth month. In general, we may divide the cases into two kinds: (1) Where the operation is done during the first two months. (2) In the next four months.

The methods that have been used are mechanical dilatation of the cervix with graduated bougies (Hegar's) or with Barnes' bags, or laminaria tents; or, placing a flexible bougie in the uterus, after the method of Krause.

In the first two months the best way to induce abortion is to dilate the cervix, cautiously, by means of Hegar's dilators, or by mechanical methods, glove-stretcher dilators, and scrape out the uterus, emptying it of its contents all in one sitting. Before the operation the vagina is thoroughly sterilized and after this the uterus is thoroughly douched with 1% lysol. As you have been clean it is not necessary to paint the mucosa with iodine or put in an iodoform pencil, or pack the uterus with gauze. I have but seldom seen hemorrhage from an abortion after the uterus was completely emptied. If the cervix is rigid it is best to prepare it by tamponing for 24 hours with 1% iodoform gauze.

In cases from the 2nd to the 6th month, do the operation in two stages, unless there is urgent need for hurry.

1st stage. Dilate cervix a little, pass one or two soft rubber bougies into uterus, pack lower part of uterus and cervix with weak iodoform gauze and vagina with sterile cotton. Wait 24 hours.

2nd stage. Remove packing and bougies. Usually pains have expelled ovum, or inaugurated the abortion. If not, may repeat procedure or clean out uterus: Will find the cervix soft and dilated, or at least dilatable, so that it is possible to empty the uterus. In removing fetuses after the 3rd month, be careful to keep them whole; a head floating in the uterus may require an hour to catch. If the fetus is removed piece-meal, collect the parts and assure yourself that the whole ovum has been obtained. Be sure whole placenta is removed, and curette uterus lightly with sharp curette, to remove thickened decidua. Beware of perforating the soft uterus. *Use the fingers wherever possible and avoid instruments.*

After Treatment—Rest for 10 days. Ext. Ergotae fl. and Ext. Hydrastis Canadensis fl. aa M x. t. i. d. No local treatment excepting external douches.

Prognosis—None should die from the operation itself. Not seldom patient will have a little fever if the treatment is prolonged, and it may extend over several days. A very disagreeable business, and one should make up his mind to do an abortion under compunction only.

No internal medication is successful and safe to bring about the expulsion of the ovum, though many are advertised. After an abor-

tion that has been treated properly and the uterus thoroughly scraped with the finger or curette, the mucosa is so much healthier that the next pregnancy is normal and the patient feels well.

DISEASES OF THE PUERPERIUM.

The puerperium, aside from minor disturbances, such as difficult urination, difficult lactation, is nowadays usually an uneventful convalescence. The puerpera does not feel sick after the second day when the soreness is gone from the muscles and joints.

The greatest danger that besets the lying-in woman is sepsis, either genital or mammary. Of course, a woman at this time may be seized with any of the general diseases, as typhoid, pneumonia, the exanthemata, etc., and these usually take on an aggravated course. They serve to render diagnosis difficult because many of the manifestations of sepsis are similar to theirs.

Nowadays cases of infection during labor and the puerperium have diminished in frequency and severity, but they still exist and many more than there should be.

Puerperal Infection—No subject in all obstetrics is more important; no branch of medicine imposes greater obligations than do the means for its prevention.

Puerperal fever, or infection, or sepsis, must be the fear and the terror of the obstetrician. He must fear it as he does sin, and as he can prevent sin, so can he prevent puerperal fever, and he must not throw any responsibility where it does not belong. Puerperal fever has been known as far back as medical literature extends. Hippocrates mentions it not under any name, but the histories leave no doubt as to their nature. (See Adam's Translation on the Epidemics.) Celsu and Galen describe it, and all through the middle ages it was known and feared.

The first lying-in hospital was established in Paris, and here the great obstetricians Mauriceau, De la Motte and Peu obtained their experience. Puerperal fever soon became epidemic in it, and Peu tells of it in 1664.

In 1750-1761 epidemics occurred in London in a private hospital. Edinburg had an epidemic in 1772, Berlin in 1778.

The epidemics broke out as the material was used for instruction, especially of the students, and as the study of Anatomy became facilitated by various states placing bodies at the disposal of colleges, the disease increased.

In Paris the disease raged continually in the great Maternité, the mortality of cases confined being 9% in 1831.

In Vienna, where the post-mortems were most carefully studied by the students under the great Rokitansky, the disease raged fearfully. In 1823, the mortality was 20% of the women confined and in 1843 almost 16%. There were two or three post-mortems daily on

puerperal fever cases, and the students went directly from the post-mortem room to the lying-in chamber.

The disease was well known in England, and its contagiousness recognized. Denman was the first to point this out and it was customary then for a doctor with a run of fever cases to give up his obstetric practice for a certain time.

The term puerperal fever is a misleading one, rather it leads to nothing. The pathology and bacteriology of infections post partum have undergone such rapid and radical changes in the last thirty years that the terminology could not keep pace with them. Thus the term puerperal fever has been retained. It was first used by Morton, in 1800.

Few men have a succinct idea as to what puerperal fever really is. To some the term conveys the idea of a septicemia only, to others a fever specific to the puerperal woman, contagious like smallpox (Barker). There are many other conceptions of the disease. To start with, I wish to propose the following definition of puerperal fever. The term "puerperal infection" is better, but the former term is older, and, if disassociated from the idea of an essential fever, and rightly understood, does very well.

Definition—Puerperal fever, or puerperal infection, is a general term comprising all the conditions, usually of a febrile nature, but sometimes non-febrile, originating from infection of the genital tract at any point of its extent.

It matters not whether the symptoms be mild, lasting but a few hours, or many days, whether there be a vulvitus or an endometritis, or a septicemia, whether one of the milder forms of saprophytic bacteria, or the most virulent streptococcus be causative, whether the patient have fever or only a rapid pulse—if the complexus of symptoms point to a genital infection the woman suffers from puerperal fever. This definition shuts out the miasmatic fevers, the essential infectious fevers, e. g., typhoid, diphtheria of the throat, erysipelas of all other portions of the body, but the genitals, etc., and since it includes many and widely differing clinical forms of disease, makes a careful classification of these forms necessary. This is not easy.

With our present knowledge of bacteriology and pathology it would seem inexplicable how this cause of puerperal fever should remain so long beyond the reach of those able obstetricians from whose works we draw so much of our information in obstetrics. But there were many difficulties in the way of investigation in those days, and again, only in the last one hundred and fifty years has obstetrics been in the hands of physicians.

Up to the 17th Century the theory of Hippocrates was the generally accepted one. He ascribed the disease to suppression of the lochia, taking an effect for the cause. Celsus and Galen accepted

this theory. The belief was that the lochia represented poisonous substances, which must be gotten rid of. If by a cold, fright, etc., they stopped, they were absorbed into the blood and thus caused puerperal fever.

Puzos of France and many after him believed the milk theory. During pregnancy the milk secretion begins, but it is all determined to the uterus where the fetus uses it for nourishment. After labor it is excreted by the breasts. If by catching a cold, etc., the secretion should be stopped, so-called milk metastases occur and cause fever. Again, mixing cause and effect. Then the milk appears in the lochia (the purulent lochia of sepsis), in the peritoneal cavity (the pus of puerperal peritonitis), in the pleurae (pus from pleuritis), or in the joints (pyemic arthritis). Chemists even claimed to have made butter from the exudate in the peritoneal cavity, one saying he had found sour milk and butter under the skin of a woman dead of puerperal fever.

At the end of the 18th century, when post-mortem examinations became more frequent, the so-called Anatomical Theory became known. This came a step nearer the truth. Puerperal fever then meant peritonitis. This being the lesion most often found. Soon another form became known, in which the veins were affected; wherefore, phlebitis, etc. In 1830, Tonnelé, of France, showed that in the majority of cases the lymphatics were involved, wherefore lymphangitis. This point is still accepted as true, but, according to Virchow, in another way.

At this time Louis was making his researches on typhoid fever, and the various infectious diseases, as we now know them, were being assigned to their places in a new terminology. So it is not surprising that a certain group of symptoms were ascribed to puerperal fever, and it came to be regarded by some as a specific disease. Cruveilhier said it was somewhat like typhoid, while the essentialistes, as they were called in France, among whom are the names Dubois, Depaul, Litzman, Michaelis, said it was due to a miasm and was a specific contagious process propagable through the air and governed by telluric, cosmic and atmospheric influences, etc. Some called it a sort of putrid fever.

In 1847 Semmelweiss, a young assistant in the clinic in Vienna, which was later occupied by Carl Braun, published his researches in a paper called "The Causation, the Definition and the Prophylaxis of Puerperal Fever," a paper which has become classic and which is a monument to his name for all time.

He announced that puerperal fever is caused by the absorption into the blood from the genitals of cadaveric poisons of any kind; that the hands or any article brought into the genitals may be the carriers of same. He did not come upon this by accident, but it was the result of years of hard work and study. He noticed that the

division of the clinic which was used for the instruction of midwives had a 3 3-10% mortality from puerperal fever, while that for doctors had 9 9-10%, and that the children were affected with sepsis proportionately also. The personnel of the hospital observed this also and regarded the doctors with aversion. He could not explain this by any atmospheric or telluric influences. He observed that women that were delivered before reaching the hospital almost never took sick.

He figured for years on these and many other similar facts until finally the death of his friend, Prof. Kolletschka, gave him the information. Kolletschka had infected his finger tip, at a post-mortem on a puerperal case and died of sepsis. The post-mortem of Kolletschka struck Semmelweiss by its similarity with those he had made on puerperal fever cases. The explanation of puerperal fever was then clear. Particles of cadaveric decomposition were carried into the puerperal wounds and there caused puerperal fever.

With the cause he sought the remedy. He instituted washing of the hands with chlorine water and later with chloride of lime solution. Result dazzling. Mortality sank to 1.27%. Later an incident, rather an accident, showed him that any decomposing animal matter can be causative.

Thirteen women lying in adjacent beds were examined in succession by the assistant and staff. The first was a case of carcinoma cervicis uteri, the rest normal cases—the twelve women died of puerperal fever.

Experimentally he introduced pus, ichor, etc., into the vaginae of puerperal rabbits. Death in all cases.

So that this theory was proved and after many years was accepted and is accepted today—that puerperal fever is caused by decomposing animal organic matter brought from without into the genitalia and there absorbed. He did not live to see his theories accepted. About 1860 signs of dementia appeared and he died later in an insane asylum.

Pasteur, Widal, Robert Koch, now came and the Germ Theory of Disease was born. Then Lister came and in the seventies the full importance of Semmelweiss' work was recognized. The reason for this delay is partly in the times, partly in the action of Semmelweiss himself, for he made numerous open attacks on the professors of obstetrics during the insanity which was darkening his horizon.

To an obstetrician, then, is due the credit of pointing the correct way to modern antisepsis and asepsis.

The contagiousness of puerperal fever was known before Semmelweiss' publication. Denman, in England, wrote of it. Dr. O. W. Holmes, in Boston, in his paper in 1843, Puerperal Fever a Private Pestilence, recognized the cause when he laid down these rules:

"1. A physician holding himself in readiness to attend cases of midwifery should never take any active part in the post-mortem examination of puerperal fever cases.

"2. A physician present at such post-mortems should use thorough ablution, change every article of dress and allow 24 hours or more to elapse before attending a case of midwifery.

"3. Similar precautions should be taken after the autopsy or surgical treatment of cases of erysipelas, if the doctor is obliged to unite such duties with his obstetrical work, which is in the highest degree inexpedient."

To Dr. O. W. Holmes is due the credit of having promulgated this doctrine and preparing the way for Semmelweiss.

Since 1870 the history of puerperal fever has been the same as that of Listerism. Whereas at first women were delivered under the spray, later the most careful antisepsis of hands, vagina, etc., was practiced. Now a more aseptic technique is being adopted. One Russian author even wished his patients delivered in an antiseptic bath.

Etiology—There is no one but admits that puerperal infection is caused by the action of living ferments, i. e., germs. These are usually introduced at the time of labor, but there are cases where infection occurs from germs present in the genital tract or nearby, before labor. This is rare, but its occurrence is no longer doubtful.

Puerperal fever, or puerperal infection, is nothing more or less than an infectious wound disease. The sources of infection are menacing any open wound, plus those formed by the anatomical construction and the functions of the parturient canal.

After labor the whole genital tract is a wound surface. The placental site has open sinuses, veins, and there are always abrasions, tears and bruises of the cervix, vagina and vulva. These may be easily infected by germs carried in from without the patient, from germs carried into the wounds from the vagina, from germs carried into the vagina and the wounds from the rectum or the skin around the vulva.

The vagina of a healthy woman before labor contains no markedly pathogenic micro-organisms. Doederlein distinguishes two forms of vaginal secretion—*normal*, which is white, like curdled milk, acid, no mucus, small in amount; and *pathologic*, which is thick yellowish or greenish mucus, sometimes foamy, alkaline usually, but not necessarily, and contains numerous pathogenic and non-pathogenic micro-organisms, whereas the normal vaginal secretion contains only the bacillus vaginae, a harmless organism.

The cervix, above its middle, and the uterine cavity, according to the recent researches of Winter, Menge and Walthard, are ster-

ile. Some cases even where the women are apparently healthy, bacteria are present.

Kronig denies the statements of Doederlein. He says he could get no pathologic results with the bacteria he found in the vaginae. One of the most recent works on the subject is by Walthard, and he finds 27% of the vaginae of his cases contained pathologic bacteria, which could be made virulent by proper culture. These statements are hard to reconcile with our clinical experience.

We cannot go any further into this study, but the general result of all the investigators seems to be that although the vagina does sometimes contain pathogenic bacteria, they require special conditions to become virulent.

What bearing has this on the question of self-infection? Of course if the vagina contains infective germs, after labor they may get into the puerperal wounds and cause puerperal fever without anybody having even touched the woman.

Ahlfeld is the most ardent exponent of this theory, but the weight of clinical experience is against it. As far as we are concerned we will regard the genital tract as practically sterile, considering the vastly greater danger as coming from without and give the role of infection from bacteria which may have existed in the vagina a very subordinate place.

How are the bacteria which get into the vagina gotten rid of or made less virulent?

Various theories. 1st, Doederlein. Bacillus Vaginae produces lactic acid which makes a pabulum unsuitable for their growth. Denied by Walthard.

2nd. Phagocytosis going on in cervix and vagina—Menge.

3rd. During labor liquor amnii possesses antiseptic properties.

4th. The passage of the child, secundines and blood scour out the parts. During puerperium the current of the lochia and the mucus covering the cervix which the lochia cannot dissolve prevent infection—Walthard.

So we believe that the vagina has the power of self-disinfection to a certain extent and this prevents infection.

This antiseptic power of the vagina is generally believed to be in abeyance during labor, so that other safeguards must be relied on, the most important of which is the antiseptic and aseptic conduct of the labor.

BACTERIOLOGY.

Up to the present time the following microbes have been proven causative of puerperal fever:

1. Saprogenic bacteria, of which Rosenbach has made a particular study.

2. Streptococcus pyogenes. Rosenbach, Pasteur, Doleris, Widal, 1879. 94% of severe cases.
3. Staphylococcus aureus, and albus. Haegler.
4. Gonococcus of Neisser.
5. Bacillus coli communis. Gebhard.
6. Bacillus fetidus.
7. Bacillus pyocyaneus.
8. Bacterium aerogenes capsulatus.
9. Pneumococcus. Fraenkel.
10. Bacillus of Diphtheria.
11. Bacillus of tetanus. Nicolaier.
12. Streptococcus erysipelatosus. Fehleisen. The identity of this germ with the streptococcus pyogenes has been about established.
13. Bacillus typhosus. Blumer. Williams.
14. Bacillus tuberculosis. Clinical.

Several of these affect certain portions of the genital tract and under certain conditions only, others produce changes at any part of the tract where deposited, and the pathologic findings and symptoms vary with the part affected. With all we may have mild and severe infection, which depends not alone on the location and method of dissemination of the bacteria, but also on the idiosyncrasy of the patient, some women seeming to possess an immunity, others a predisposition to certain microbic infections. A careful study should be made to determine the bacterium causing the disease in each case, and as our efforts become more successful in this line we may expect more rational and successful methods of treatment.

SOURCES OF INFECTION.

These are many and are divided into two kinds:

1. Those entirely from without the patient.
2. Those from within the patient.

The most common source of infection is the physician. He brings an infected finger, instrument or other foreign body into the genitalia. This infection he has carried from a case of puerperal sepsis, from dressing an ulcer, or from any suppurating or infected surface. Other sources from which infection may be carried are post-mortems, erysipelas, cancer, lochia, even of normal puerpera, diphtheria, scarlatina, typhoid, pneumonia, ozena and even the ordinary filth under the finger nails. The nurse may infect the patient in the same manner. In addition, the menstrual blood is infectious.

The patient has certain sources of infection herself. The vagina may not be aseptic at the time of labor, e. g., coitus may have been recent; the patient may have examined herself. The rectum is close

by and contains the colon bacillus. The bladder is sometimes infected. The vulva is never sterile. The patient may have a suppurating focus in some distant part of the body, e. g., an artificial eye, erysipelas, tuberculosis with secondary infection, a felon, etc. The physician may infect the patient by carrying these infections into the puerperal wounds, or the patient may carry them there herself, or in rare instances they may invade the genital tract themselves, by way of the blood stream.

The number of cases referable to this form of infection is very small, compared with those where the poison is introduced directly by the physician from without, so that much responsibility rests on the accoucheur in the prevention of child-bed fever.

Prophylaxis—Much can be accomplished in prevention as compared with the little by treatment of infection. In general the same principles are applicable here as in the care of any surgical operation. I. *Limit as far as possible the puerperal wounds.* II. *Prevent the infection of the necessary puerperal wounds.*

(I) 1. General Rule—Interfere as little as possible in the course of labor. Operate only under urgent necessity.

2. Make vaginal examinations few, hardly ever more than two for a normal case. Make diagnosis of presentation and position of fetus by abdominal palpation. Gently do the internal examination, which must be short.

3. Let the bag of waters rupture spontaneously, because:
   (a) The child is in little danger of asphyxia while it is intact.
   (b) Nothing dilates the cervix with less trauma, hence little tearing.
   (c) Mechanically prevents the access of air, with germs.

4. Do not give ergot during labor. Instruments more often necessary.

5. Avoid all practice to cut short the length of labor, e. g., dilatation of os or of the perineum.

6. Express placenta by Credè method. Keep hand out of uterus post-partum as much as possible. Conduct third stage so as to leave no membrane or clots in uterus and vagina.

(II) One must consider—

1. The operator and nurse.
2. The patient.
3. The paraphernalia.
4. The environment.

The Operator—Clothes should be clean, no contact with post-mortem tables, pus basins, etc. Bathe frequently and shampoo

beard and head often. Always have clean finger nails and hands. A general cleanly appearance invites the confidence of your more intelligent patients. *Scrupulously avoid touching infective material!*

Method of Preparing Hands for Obstetric Cases.

General Rules:

1. Keep the hands aseptic as far as possible by avoiding direct contact with infective matter of all kinds. Use rubber gloves when treating infected cases.

2. After all dissections, dressing pus cases or erysipelas cases, or touching the lochia of puerperal cases, sterilize the hands.

3. After attending diphtheria or scarlet fever cases, etc., change clothing, bath, shampoo head and beard.

Sterilizing the Hands, and the Obstetric Examination—

1. Coat off, sleeves above the elbow for *all cases.*

2. Scrub in running water or frequent changes for five minutes. Rinse and dry.

3. Now pare and clean the finger nails carefully.

4. Wash for one minute in hot water; dry the hands and make the external examination. After this—

5. Get two solutions ready, near the bed:

(I) 1:2,000 bichloride.

(II) 1:1,000 bichloride or 1% Lysol.

6. Now scrub for five (5) minutes in running water, paying attention to the creases and under the finger nails.

7. Wash the vulva with solution No. I, leaving a bit of soaked cotton in the vulva. (Patient has already been once prepared.)

8. Now scrub in the solution No. II for a full minute and carry the two first fingers, still wet with the solution, directly into the vulva, *being sure that they touch nothing on the way.*

After having to do with septic cases, double the time of each procedure and wash the hands with alcohol just before point 8. Use sterile rubber gloves.

The accoucheur should wear a gown and cover head and beard. Rubber gloves should always be used.

The Patient—Should bathe frequently in the last months of pregnancy. Before labor she should take a general scrub bath, paying particular attention to the genitals, with soap and water, and then go over the hip region with 1:1,500 bichloride, giving special care to the vulva. The vulva hair should be clipped.

If you find a vaginitis granulosa in pregnancy use 1:2,000 permanganate douches, ichthyol gauze and before labor a 1% Lysol douche.

The Paraphernalia—All instruments, cotton, gauze, etc., that comes near the patient must be sterilized. Instruments must be boiled five (5) minutes in 1% soda with lid on. Catheters and douche points boiled and passed by sight. Water for douches, etc.,

must be boiled and cooled. If obliged to use from tap always use an antiseptic to sterilize it, allowing plenty of time for same.

The Environment—Of least importance. It is nice to have a clean bed and clean room to work in, but not absolutely necessary. If the doctor has mastered the principles of asepsis he can confine a patient on a door mat and have no fever. The work in the Chicago Lying-in Hospital Dispensary has proven it. Lay down this law. If you sterilize the vulva and sterilize the finger, and every instrument, etc., going into the vagina, you need never worry about getting a case of puerperal fever.

CLASSIFICATION OF PUERPERAL INFECTIONS.

Puerperal infection is a protean disease. There are mild and severe cases, local and general infections, many kinds of germs causative, and women react differently to them, so that the clinical pictures are exceedingly complex and one can seldom arrive at a perfect diagnosis.

A classification founded on the bacteriology, a biological or botanical classification, would certainly be most scientific. While, no doubt, many microbes produce distinct clinical pictures, too large a number produce similar symptoms, or are intermingled, to allow the clinical use of a classification based upon bacteriologic investigation of the discharges, blood, etc. Further, one microbe may produce differing clinical forms of disease. We can often in given cases say this or that microbe is causative, but this forms at present an uncertain guide to the treatment. Examples of this are diphtheria, the streptococcus and lately the staphylococcus, and the tetanus bacillus.

The streptococcus causes 9-10ths of the severe infections, yet sometimes a patient will run a mild fever with this germ. The staphylococcus aureus is sometimes mild, sometimes severe, in its effects. If, for example, the streptococcus is associated with the bacillus coli communis, a very virulent type of disease will result—and so on.

Another classification is that based on anatomic-pathologic findings, and which divides the cases strictly according to the parts involved. Thus there is vulvitis, vaginitis, endometritis, parametritis, perimetritis, metrophlebitis, etc. Clinically, this is better, but not all the forms of puerperal fever are localized to the sites at which the infection enters—a general sepis may occur from a frenulum tear, and any of the germs mentioned may gain entrance at any place in the genitals and produce various and complicated symptom-complexes, and further the simple knowledge of the site of the disease is not a sufficient guide to a rational treatment. To say, for example, that a woman has endometritis is by no means enough.

Finally, a clinical classification must be considered. This di-

vides the whole group of symptoms into three grand classes—first, sapremia; second, septicemia; third, pyemia.

Sapremia means the absorption into the blood from a focus of decomposition, of the products of germ activity, i. e., it is a septic intoxication. Though the term is limited to the saprophytic infections, the intoxication from pus located in the genitals may come under this head.

This is a very convenient term to use for that class of cases where a decomposing blood-clot, or piece of placenta, or pent-up-lochia, in the uterus or vagina, give rise to fever, which disappears when the cause is removed.

Septicemia means the absorption into the blood of living ferments—germs—which, multiplying there, produce death by the toxines produced. Any local infection can be the starting point of a general septicemia. It cannot be doubted that in all local infections some germs get into and are killed in the blood.

Pyemia really is a septicemia. It means literally pus in the blood, but is used to describe those cases where infected emboli start from a focus of suppuration and, becoming lodged in distant organs, start up new foci of suppuration.

Now these three forms almost never exist alone, but are more or less combined. Saprogenic bacteria develop with the virulent streptococcus, and the former may, by weakening the barriers put up by nature, prepare the way for an invasion by the chain coccus. The staphylococcus may produce a local inflammation from which toxines are absorbed, producing chill, fever, etc.—this is septic intoxication. Should the blood be finally invaded the symptoms aggravate—this is septicemia or septic infection. The clinical pictures thus produced are often indistinct, requiring acute observation and clinical experience to distinguish between them.

The saprophytes do not multiply in the blood, they live on dead and necrosing tissue; thus they may exist on the sloughs caused by the pus germs. If they cause death it is by the ptomaines absorbed.

The pus germs, particularly the streptococcus, are ubiquitous, acting in three ways—first, as a purely local rapidly healing process, with mild, general symptoms; second, as an acute general infection, usually fatal; and, third, as a more chronic disease under the picture of a pyemia with metastatic abscesses and inflammation. In addition to all these we have the clinical forms of tetanus, erysipelas, diphtheria, gonorrhea, etc.

Now out of this chaos is it possible to evolve a single classification which shall cover all the cases and be a working guide to the treatment? It is not possible, and I do not think it is desirable at present.

Credè divides the cases into local and general, which is convenient from the standpoint of treatment and prognosis.

No single classification will cover all the conditions. We need all

three and in practice the diagnosis will have to comprehend an understanding of—

(1) The site of the infection and its course.
(2) The extent of the infection, whether purely local or already general.
(3) The kind and the virulence of the germ that is causative.

To get all this information requires—

(1) An intimate knowledge of the clinical pictures produced by each germ, in all variations of virulence and of site of infection.
(2) A study of the case by examination of the patient, the discharges, the blood, etc.
(3) Intelligent observance of the progress of the disease.

Thus our diagnosis will run as follows:

Sapremia, or septic intoxication, due to vulvitis, or decomposing decidua, or lochiometra or lochiocolpos.

Septic intoxication, from an endo- or parametritis.

Parametritis and septicemia, from infection of a cervix tear with the streptococcus.

Endometritis, septicemia, pyemia, due to pus germs.

Endometritis, peritonitis, streptococcus of erysipelas.

Diphtheritic vaginitis, Loeffler's bacillus—and so on.

Clinical Forms of Puerperal Infection—We distinguish the following types of infection which are fairly constant, though new and unusual forms appear frequently:

1. Vulvitis and colpitis.
2. Endometritis, mild and malignant.
3. Fever, etc., from pent-up lochia, in uterus or vagina, from infected material in the uterus or the vagina.
4. Sapremia, which is cured by removal of the offending material.
5. Parametritis.
6. Peritonitis, local and general.
7. True septicemia. (So-called "puerperal fever.")
8. Septico-pyemia. (Metro-phlebitis.)
9. Septic endocarditis.
10. Phlegmasia alba dolens.

Many symptoms are common to all of these conditions and the diseases are often combined.

Vulvitis—More or less severe inflammation of the vulva. Edema, redness; the little puerperal wounds are covered with gray exudate, with red edges (puerperal ulcers), with purulent discharge; non-union of perineorrhaphy—pus.

Causes—Traumatism during labor and infection. Pre-existing vaginal or vulvar infection (e. g., bartholinitis).

Symptoms—Usually slight if there is drainage. Temperature 100-101. Pulse 80-100. Patient complains of burning in urination, sense of heat and slight pain locally. If a perineorraphy done which is infected, the symptoms may be severe; high fever—104°, high pulse—120, chill, malaise, etc. These usually subside after removal of the sutures, but sometimes a general sepsis results.

Treatment—Remove all sutures at once. See that drainage is good and touch all the wounds with Tr. Iodine. Then douche the external parts with some antiseptic solution every four hours. For pain during urination and distress, hot applications of liq. plumbi subacetatis.

Vaginitis—The same findings as in vulvitis, but there is more swelling, more purulent secretion. The puerperal ulcers are found and if the streptococcus is present they are covered with a diphtheroid exudate. The lymphatic are swollen and the neighborhood of the vagina infiltrated.

Causes—Traumatism during labor. Too many examinations long labor, forceps operation, hot douches, prolonged use of the colpeurynter, tamponade, especially strongly antiseptic gauze—all these plus infection, which, of course, is thereby favored. It is remarkable, the recuperative power of the vagina after injury if there is no infection. Sometimes diphtheria of the vagina.

Symptoms—The same as vulvitis but more severe. Temperature higher, 103°, pulse, 110 to 120, both depending on the kind and virulence of the causative germ.

If the drainage is free symptoms milder, if not, the condition is called lochiocolpos, and general symptoms severe until condition is relieved.

Treatment—Remove sutures if there are any, and touch puerperal wounds with Tr. Iodi. Then leave the patient alone, as long as drainage is free. No douches because they may carry the infection higher, and they can do little good in combatting the germs in the tissues.

Keep bowels free. Keep the patient quiet. Give ergot M. xv t. i. d. Give urotropin gr. v t. i. d., if there are any bladder symptoms. Light but generous diet, and patient will usually get well.

ENDOMETRITIS.

This is the most common form of infection, although seldom occuring alone—but often combined with colpitis or metritis. Very few infections without it.

Predisposing Causes—

(1) Endometritis during pregnancy. That a microbic endometritis can occur during pregnancy there are cases to show.

(2) Infections of the endometrium before or during labor by examination, bougies, colpeurynters and by gonorrhoea, or cases where liquor amnii is already decomposed in a long labor.

(3) Retention of remains of decidua or the chorion or especially pieces of placenta or perhaps a blood clot.

(4) Severe bruising of the lower uterine segment by operative procedure.

How do germs get into the uterus?

1. By the fingers pushing the vaginal secretion into the uterus or directly placing new infection there. Same true of instruments, e. g., forceps.

2. Entrance of air into the uterus during long labor and frequent and careless examinations.

3. Relaxed uterus—stasis of lochia—germs can wander along surface—Rare.

4. Shreds of membrane hanging down into the vagina can form bridges on which the germs get into the uterus. (Schroeder.)

Now it must not be supposed that the presence of decidua or even a piece of placenta in utero means that it will cause an endometritis. The infection must also be present. Pieces of placenta can remain in the uterus for weeks without decomposing, till, after a careless examination, the infection begins.

The importance of a well contracted uterus was recognized even in the olden time. A uterus that is relaxed absorbs very actively ptomaines produced in its interior, and again it allows them to accumulate here. A well contracted uterus expels decomposing clots, secretions, etc., and in addition has less absorptive power. If the uterus becomes bent on itself at the cervix, especially after the 6th day, when the uterus being strongly anteverted may catch behind the symphysis, the lochia may be pent up in the uterus and a condition analogous to lochiocolpos results. It is more common than this and is called *Lochiometra*. It usually causes a severe chill and rise in temperature, which goes down just as quick if the cause is removed.

Pathology of Endometritis—Mucous membrane red, swollen, softened, rugous, covered with necrotic decidua, secretion mucus or muco-purulent and hemorrhagic. Cervix also involved, is edematous, eroded—Bloody, with increased secretion.

Under the glandular layer is a bank of white blood corpuscles, forming a barrier against the germs which infiltrate the decidua. The saprophytic bacteria and the pus germs are here involved.

Bumm—Made bacteriologic and histologic study and found three forms of reactive inflammation:

1. That due to infection with saprophytes, and is shown by the decomposing of the decidua.

2. That due to infection of the decidua with pyogenic organ-

isms, but in which they are limited to the surface by the wall of granulation tissue.

3. Same as No. 2, but the germs break through the wall and get into the spaces between the muscles.

The endometrium becomes intensely infected and inflamed—soft as paste, gray, greenish or black. Distinction of the structures of the parts is lost, or the surface may be covered with a diphtheroid membrane (not true diphtheria), and in the speculum (which you must never use) shows the cervix eroded and covered with this croupous exudate. The uterus becomes edematous, involution ceases, the muscle relaxes and the ptomaines and germs find ready access to the blood.

Or the endometrium may be cast off with a piece of the muscular substance forming a large slough,—the Metritis Dissecans of Garrigues. These changes are those of acute Septicemia, the consideration of which we will have later.

Symptoms of Endometritis—

I. Subjective—Chill or chilly sensation with rise of temperature, on the 3rd, 4th or 5th day. Very little pain. Temperature goes to 102-103. Pulse, 100-110. Malaise, headache, feeling of heat, etc., are mild. Usually patient sleeps well, which is a very good sign, showing mild character of the disease. Milk secretion normal. Constipation often present. After pains are sometimes severe—an important sign, as they usually have ceased by the 3rd day and the reappearance is significant. Otherwise patient is not very sick.

II. Objective—Lochia usually fetid, at first decreased, later increased in amount. Remain bloody longer, and may erode the vulva —because irritating. Uterus somewhat retarded in involution, softened and a little tender. In uncomplicated cases no tenderness to either side of the uterus or of the peritoneum. No tympany—abdominal walls not tense. Fever—has morning remissions of 1½ degrees, and lasts from 4 to 10 days. Unless the process gets worse symptoms disappear in a few days. If the disease takes a bad turn, the general symptoms become grave, the patient immediately shows she is very sick.

Treatment—The treatment of ordinary endometritis. At the first rise of temperature or chill that announces the infection, carefully examine the patient to see if you can determine any other cause for the fever. Here is where the question of "milk fever" comes up. As the milk begins about the 3rd day, a great many cases of temperature are referred to the breasts, when really an endometritis is at the bottom of it. I do not believe in "milk fever"—but we will consider that subject later—under mastitis.

Exclude by careful examination all the causes for fever, e. g., general diseases, typhoid, pneumonia, angina, constipation, etc. By careful consideration of the symptoms you can usually arrive at a

sufficiently positive diagnosis to act on. (See treatment of next subject.)

Fever from Retained Foreign Matter.—Lochiocolpos and lochiometra have been referred to. They usually give rise to fever with symptoms more or less severe, depending on the nature of the infection, which disappears rapidly when drainage is established.

When a puerpera develops fever, which, by exclusion, is found to come from the genitals, the first question that arises, is there anything in the uterus? If there is a piece of placenta, a clot, a mass of membranes in the uterus, the same may not become infected if the uterus is firmly contracted and if no infection is carried in from the outside. Should it become infected the symptoms are those of endometritis, of which there is more or less always.

In most cases the infection remains local, the germs growing on the dead tissue and the absorbed toxines causing the symptoms. A large number of germs probably get into and are killed in the blood, but there is no invasion of the lymph and blood streams, as in septicemia. The danger of these infected, necrosing bodies, lies then in their providing a favorable nidus for the virulent streptococcus, in developing the virulence of weakened cocci, or the alteration of the subjacent mucosa, so that it offers less resistance to the micro-organisms present in the vagina, cervix and uterus.

Diagnosis of material in the uterus—History of the labor. May know that the placenta and the membranes were not complete, that there is a blood clot in the uterus, e. g., hemorrhage post partum, which ceased gradually. If do not know, suspect under these conditions:

1. Large soft uterus.
2. Long continued and severe after-pains.
3. Bloody lochia, and presence of clots in it.
4. May feel them by examination.

If in doubt, the case not being your own from the start, it is better usually to clean out the uterus anyway at the beginning of treatment.

Sometimes the uterus will expel the putrid mass and the fever will at once disappear. We may wait for this if the case impresses us as a mild infection, but usually we cannot be assured that this is so, and we must know the uterus is empty.

Treatment—When there are pieces of placenta, or masses of membranes or blood clots decomposing in the uterus and giving rise to septic symptoms, they must be removed. The preparations are the same as for any severe gynecological operation. The vagina is especially well cleansed with a lysol douche (1%). The uterus is also douched and then with the finger the whole uterine mucosa is cleaned off smoothly. After this another lysol douche is given and a strand of iodoform gauze is left in the uterus for 5 hours.

Give the patient ergot and hydrastis, ext. fl. aa M. x, q. i. d.; put an ice-bag on the lower abdomen, keep bowels open with cascara and enemata. Give tonics, Tr. Nux. Vom. M. vi., q. i. d.; baths for temperature. Water freely, light strong diet.

Leave the uterus alone as long as there is good drainage. No douches or other local treatment except the external antiseptic douches to the vulva.

Not seldom the manipulations in cleaning out the uterus are followed by a chill and a sharp rise in temperature, due to the flooding of the system with toxines, and the re-inoculation of the blood from the freshly abraded surfaces. In rare instances, a severe form of fever may result from the interference, but usually the temperature goes down very soon and stays nearer the normal, and recovery must be attributed to the emptying of the uterus.

PARAMETRITIS.

Another of the milder varieties of puerperal infection is parametritis. Pelvic cellulitis is a better term, as the infection may gain entry to the cellular tissues not alone at the sides of the uterus but at any point from the vulva to the tubes. Lymphatic glands at base of broad ligaments sometimes enlarged.

Cause—Is infection which gains entrance to the cellular tissue. All severe local infections are attended with some cellulitis, which, in malignant cases, arises by direct transmission through the uterus.

In most cases the atrium of infection is a wound of the cervix, lower uterine segment, vagina, or perineum—named in the order of frequency.

The staphylococcus and the streptococcus are usually causative, though other germs have been found, e. g., the gonococcus.

The connective tissue spaces at the side of the uterus are large and the planes of fascia many. The cellulitis is like cellulitis anywhere else, first inflammatory edema, then white-celled infiltration. A tumor formed of inflammatory exudate forms at the side of the uterus. This exudate may extend to the walls of the pelvis and travels in several directions.

1. It may expand the folds of the broad ligament and rise high in the abdomen.

2. It may go to the side of the pelvis and get up into the iliac fossa.

3. May go down under the Poupart's ligament.

4. It may extend up the infundibulo-pelvic ligament into the false pelvis, and along the psoas, in which event we must expect troubles due to involvement of the nerves of the lumbar plexus.

5. It may extend anteriorly around the base of the bladder, parametritis anterior.

6. Posteriorly along the utero-sacral ligaments around the rectum. (Later strictura recti.)

7. It may from here go up along the sacrum till it reaches the kidney.

8. It may go down toward the perineum, around the vagina and finally reach the vulva; or,

9. Out of the sciatic notch.

Depending on its location it displaces the uterus to one side or the other, and upon its extent will depend the condition of the parts. If there is extensive exudation the pelvis may seem to be filled with a hard, resisting medium, all contour of the uterus and adnexæ being lost, and the vaginal fornices being depressed. It feels as if plaster of paris had been poured into the pelvis.

The extension of the process depends on—

1. The virulence of the germs involved.
2. The number introduced.
3. The general condition and resistance of the patient.
4. The amount of local injury inflicted.
5. The kind of treatment given.

Where severe and brusque operations have been done in the passages, the infection is more liable to be severe. These exudations are gotten rid of in two ways:

1. Resolution and Absorption.
2. Suppuration.

In the former case the exuded fluids are re-absorbed, the white blood corpuscles are broken up and removed by the leucocytes, or are changed into connective tissue, which leaves dense cicatricial thickenings to mark the site of the inflammation. These cicatrices distort the pelvic organs, both as regards position and shape, and function. The uterus is sometimes found drawn over to one side of the pelvis and moored here immovably; or, it may be drawn up toward the sacrum by the shortening of the utero-sacral ligaments, Schultze's Anteversion.

If the process ends by suppuration, there appear in various parts of the exudate necrotic areas and these become converted into pus. The whole exudate may become one abscess, or several, separated by septa. Thus, the whole pelvis may be riddled with abscesses. Depending on the location of the exudate, and its proximity to one of the hollow organs of the pelvis, pointing will occur, and unless there is operative interference, in the course of twenty to seventy days the abscess will break into the rectum, vagina, bladder, ureter, skin or general peritoneal cavity. Then, if there be no other focus of suppuration the cavity closes rapidly. If there are other foci, these may undergo the same process and thus the patient may be sick with suppurating cavities for months and even years.

These latter cases and the immense exudates extending to the

navel or kidney, are very rare nowadays, but in pre-antiseptic days they were common. The milder forms of parametritis, where the only relic of their existence is a little thickening in the fornices or in the uterine ligaments and displacements of the uterus, are very common. Emmet, of N. Y., was the first to emphasize this frequency. According to Winckel, pelvic cellulitis suppurates in 18% of cases. That an inflammation of the pelvic connective tissue can exist without some involvement of the peritoneum, which is so near it, is not to be thought of, so pathologically we find the local serous surface inflamed, with the intestines matted together. In fact, it is sometimes hard to say whether the peritonitis is primary or secondary.

Symptoms of Parametritis—In the mildest forms, such as often are found during a gynecologic examination, as a thickening in one of the fornices, the symptoms during the puerperium are slight. A slight rise of temperature, a little local tenderness, or slight febrile symptoms, which are sometimes referred to something else (as "*milk fever*"), and the disease passes unnoticed.

For the severer grades, however, there are marked signs of disease. The symptoms usually begin on the 3rd or 4th day. If the 5th day has passed, according to Olshausen, there is little danger. Still, I have seen parametritis begin on the 8th or 9th day. These cases are called *late fever*, and are sometimes due to too early getting up—which starts up anew an unnoticed parametritis, or the movements tear open some small wound in the cervix, or, after some local treatment or examination, these wounds are reopened, and infection enters.

Chill or chilliness, fever, 103-104. Pulse also goes up to 100-110. Marked local pain and tenderness. Movement in bed is painful to patient. Coughing and sneezing painful. General symptoms of fever, e. g., headache, sleeplessness, anorexia irritability, general tenderness.

Locally tenderness at either side of the uterus. Sometimes the uterus itself. Some tympany and tenderness of the abdominal wall. Internally (but you must not examine), you would find the whole pelvis hot and soft, but at one point great tenderness and perhaps a well defined thickening or tumor, the exudation. Lochia usually fetid from concomitant endometritis or colpitis, but not necessarily.

Sometimes the parametritis may be hidden under general symptoms of sepsis. The fever is remittent in character and especially irregular if suppurations occur in the exudate. Then chills, fever and sweats occur—the patient passes into a condition called hectic, and unless the pus cavities open or are incised, the patient dies of exhaustion and sepsis, having wasted to a skeleton.

If the abscesses open or are well drained, they heal rapidly, and if the patient's strength lasts they get well.

If absorption of the exudate takes place the temperature grad-

ually goes down, the local symptoms disappear for the time, but later, symptoms referable to some pelvic displacement, make themselves apparent and often the patient beomes an invalid for life.

Resolution may require only ten days, while sometimes it may be sixty days, before the patient can safely get up. Bursting of a parametric abscess usually occurs after the fourth week. The severity of the local process can generally be determined by the general symptoms, e. g., temperature and pulse—but not always, as sometimes a moderate amount of exudation causes severe symptoms, while again a large exudate will occur with only mild manifestations of disease; sometimes none at all. You may examine these cases internally when you have reason to believe the inflammation is sharply defined and the puerperal wounds cicatrized.

Prognosis—Usually good. With proper treatment patient has a mild course of fever, and absorption of the exudate takes place. Even after the formation of an abscess prognosis as to life is good, as they either break or are incised and then heal. In the larger abscesses, prognosis guarded, as they sometimes suppurate for months, and the pelvis is riddled with sinuses and patient finally dies of hectic and exhaustion.

Prognosis as to health is generally good, but only too often the women have backache, leucorrhea or disturbed pelvic circulation—dysmenorrhea and symptoms of uterine displacements. The scars may contract and cause pressure on the nerves, neuralgias and paralysis, or on the ureters (which the exudate may also do), and hydronephrosis, or traction on the bladder, and cause tenesmus, or the rectum may become strictured. The uterus is drawn to different parts of the pelvis and fixed, or it is walled up in exudate and atrophies.

Treatment—Same as for perimetritis, and will be considered under that heading.

PERIMETRITIS.

This is an inflammation of the pelvic peritoneum. Inflammation of the general peritoneum we will consider under the heading, septicemia, of which it so often forms a large part. The fact that this is a localized peritonitis shows that we have to do with an infection with germs of mild pathogenic power. Such is the case, for the germs found are sometimes the saprophytes, staphylococcus or the gonococcus.

A peritonitis caused by the streptococcus is always dangerous. A slight infection may occur after considerable trauma, as where the walls of the uterus were strongly squeezed or torn. If the case is moderately clean we have local inflammation; if infected, the inflammation extends over the whole peritoneum, and the course is rapidly fatal.

Perimetritis, which, as you must understand, is the milder form

of peritonitis, develops therefore from: (1) Infection of the endometrium, which travels along the lymph vessels to the peritoneum, as was shown by Tonnelè; (2) a parametritis may develop from a torn cervix and the infection, without making any great changes in the broad ligaments, reaches the peritoneum, causing spread of the inflammation there; (3) the lower uterine segment may be compressed between the promontory and the fetal head, pressure necrosis occurs, and if even a moderate infection is present, a peritonitis may start. The same is true of the ruptures of the lower uterine segment, if aseptic, the surfaces adhere by reactive inflammation. If a careless examination is made and the surfaces torn apart, an infection occurs, which is rapidly fatal; (4) gonorrheal infection from a pus tube, which breaks during labor or from the end of which pus oozes out; or gonorrhea may cause an endometritis or salpingitis and extend from the vagina and cervix to the peritoneum. These occur in the latter days of the puerperium and a peritonitis developing after the ninth day is almost always gonorrheal. (5) Further, the Bacillus Coli Communis is sometimes found. It wanders through the intestinal walls when these have made adhesions and the wall is, therefore, diseased. Causative of peritonitis is Bac. Coli Com. by no means unless introduced from the vagina.

The pathologic findings are such as are usual in these cases. The peritoneum is reddened, the surface lustreless, the bowels distended, adherent to each other, deep red streaks on them where the surfaces do not directly press on each other, and are covered with long strings of fibrino-pus, and serous exudate. Between the matted intestines a sero-pus is found in which float whitish yellow flakes of fibrin or the exudate may be all fibrin and pus.

In the milder forms these are the findings, but in the severer cases the process extends over the whole peritoneum, whose surface is about equal in extent to that of the skin. The exudate may be tinged with blood, has a penetrating but not disagreeable odor, and may sting when the hand is immersed in it. The amount of exudate is generally small, but sometimes reaches two quarts if the patient lives long enough.

It may be bound off by adhesions, making local collections of pus similar to those of parametritis, which may break into neighboring organs or creep further and may extend up to the diaphragm; the way being laid out by an advancing line of fresh adhesions which prevent general peritoneal infection. Care in palpating these cases, as rough pressure may cause these to rupture and make a general peritonitis.

The usual locations for these collections of pus are in Douglas' cul de sac, and high up at each side of the uterus in the fold between the infundibulo-pelvic and broad ligaments. As they form when the uterus is in the abdomen and become adherent at the level

at which they form, they do not sink with the uterus and therefore are found high up. This distinguishes them from parametritic exudates which are low, nearer the vagina.

Course—The course of these exudates is the same as in parametritis. I. Resolution and absorption; II, suppuration and abscess. Latter more common than in parametritis. Former takes longer than in parametritis, and the organs are left more deformed and bound down or matted together. Frequently left gynecologic invalids and often sterile.

If abscess forms it may break into the bowel, vagina or the bladder. There may be a series of abscesses which have to be incised.

Symptoms—Patient almost always has a chill or chilly sensations. The symptoms begin almost always in the first 72 hours after labor, seldom later. Great local pain. Rise of temperature, which goes up steadily, reaching a point not as high as parametritis. The pulse goes up, however, rapidly and markedly. Even on the first day an increase in the pulse rate is notable, later is thready, or, as it is called, the peritonitis pulse. Patient has anorexia nausea, sometimes vomiting, usually constipation, great thirst, may be dysuria. Pain a prominent symptom.

Objective Findings—Patient has suddenly become ill. The change in the lines of the face strike the observer. Nose pinched, eyes sunken, extremities cold. Pulse thready, running. Abdomen distended, knees drawn up. Patient lies very still. Abdomen tense, extremely tender, especially hypogastrium. Uterus hard to find. Lochia often diminished, fetid. Lactation often ceases.

Course of the Disease—Majority get well if the inflammation remains localized, also if the gonococcus is involved alone, and if it is due to trauma with mild infection. If the pain is very severe it is a good sign, as the process usually becomes localized (Fehling). The general peritonitis so quickly benumbs the patients that they are not tender. Fever continues four or five days, but the patient may have an evening rise of temperature for a week or more. Later the symptoms of chronic pelvic peritonitis and those of adhesions come on.

If suppuration occurs the patient becomes hectic and passes through the same course as in parametritis. The pulse gets better quickly if the process tends to localize, but if it tends to spread the pulse goes up, getting smaller and weaker. The pulse is therefore the most important index as to the severity of the disease.

Differential diagnosis from Parametritis—the peritoneal symptoms, e. g., pulse, nausea, tympany, collapse, pain, etc. If the peritonitis becomes general, symptoms get worse. Pulse imperceptible, may be rapid. Temperature goes down, pulse goes up. Collapse, facies Hippocratica. Immense distension of the abdomen, involun-

tary bowel movements and urination. Vomits green—consciousness till near the last, however.

Treatment of Parametritis and Perimetritis—

I. Rest, absolute.

II. Opium, to quiet pain, procure rest and sleep.

III. Ice-bag, Leiter's coils. See that they are well applied.

IV. Local treatment at very beginning. Nothing later. If there is anything in the uterus it must be removed as early as possible.

After peritonitis symptoms are present it is risky to tamper with the uterus. Some authors advise leaving it alone, at all hazards.

V. Diet and support of patient—First 36 hours nothing but perhaps a little water. As the symptoms subside, a full liquid stimulant diet is instituted. Tonics.

SEPTICEMIA.

This is what was formerly known as Puerperal Fever—considered an essential disease, peculiar to lying-in women, contagious, like small-pox, due to the action of some external morbus, carried by the air, water, or soil.

Semmelweiss tried to impress on the profession that it was nothing but a wound infection—an opinion which is now held without question.

Definition—Septicemia is an acute infectious disease, due to the entrance into the blood of microbes, usually the streptococcus pyogenes, but sometimes of other cocci and bacteria, and their toxines, which produce a dissolution of the blood, degenerative changes in the organs, and symptoms of a rapid intoxication. The toxins alone may be absorbed from a focus of infection and may be sufficient to cause death. Septicemia may begin as such from an insignificant atrium of infection and may destroy life without marked local symptoms, the disease running its course in 24 to 72 hours, but usually there are local symptoms which indicate the source and the site from which the poisons are invading the blood.

Septicemia may develop suddenly in the course of what seemed to be a mild endometritis or other local inflammatory process, due perhaps to improper treatment; or weakening of the resistance of the patient.

Any of the local infections already considered may be the source of a general infection, e. g., a perineal tear may give rise to a virulent sepsis. It is often difficult to say how much of the severity of the disease is due to toxines absorbed from the infected pelvic structures, and how much from the invasion of the blood by germs.

Symptoms—Sometimes begin during labor, or before the third day. Severe chill, acute rise of temperature, 104-105—continuous fever with but slight morning remissions. Pulse immediately rises

in frequency, grows small, compressible, 140-160 even on the second day in severe cases.

Respirations increased in frequency, shallow, with no lung complication, 40 to 60 per minute; due to early disintegration of the blood, with the loss of the oxygen carriers.

Malaise, apprehension of a dangerous illness, even early the instinct of death impending, general prostration, patient seems to have been struck down, the change is so marked. Headache, early sleeplessness (a very significant symptom if there are no other causes for it). May be slight delirium.

Symptoms of peritonitis very soon begin and the facies Hippocratica shows the fatal termination is not distant. The lochia are usually putrid, the result of a gangrenous endometritis, though sometimes the lochia are scant, the odor is not marked, being pungent to the nostril. The puerperal wounds become necrotic. Signs of peritonitis begin, and if the patient lives, become marked, and the picture becomes one of virulent peritonitis. The temperature goes down, the pulse higher, the tongue dry and fuliginous. The patient has a peculiar, fruity odor, sweet, sickening, may be very marked. After three or four days the patient feels easier, but the objective signs are worse. There is great tympany, the patient is cold, sometimes even the trunk, with a cold sweat, she is of a yellowish color, while the translucent parts, e. g., nose and ears are leaden gray. Consciousness is retained till a few hours before death, which usually occurs in coma. If the patient lives long enough a pleuritis develops. Disease lasts from 2 to 10 days. Is especially virulent if it begins during labor, when the course is usually short and violent, "foudroyante." Eruptions on the skin occasionally occur, resembling scarlatina.

Diagnosis of Sepsis—Really consists of a proper estimation of the severity of the attack (as from the milder forms), and this you must make early, as everything depends on it.

1. General impression of a severe sickness—collapse.
2. Pulse and temperature—chill.
3. Local findings—uterus large and soft. Lochia fetid—pus.
   A soft uterus one of the first signs of infection.
   A hard uterus a good barrier to infection.
4. Sleeplessness—Delirium.
5. History of case, e. g., placenta previa with severe operations —midwives and doctors that are not clean.

Prognosis—Usually fatal. Rarely get well. The earlier the symptoms appear the worse the prognosis.

Pathologic Anatomy—

1. Endometritis-gangrenosa, or diphtheroid—the whole uterus being gangrenous—ichorous. The process often begins at the vulva and the whole genital tract is badly inflamed.
2. Parametritis is usually present and lymphangitis, the lymph

vessels filled with thrombi. The connective tissue may be infiltrated, edematous, and this may spread with great rapidity. This cellulitis may spread so fast and far as to justify the name Virchow gave it—Erysipelas puerperalis malignum internum.

3. The lymph vessels alone involved—full of lymph and sometimes infiltrated with pus—find them at the side of the uterus. The changes in the parametria may be simply a serous infectious edema, or necrosis may occur—a real phlegmon.

4. Pelvic peritonitis, then general peritonitis.

5. If the patient lasts long enough—pleuritis and pericarditis.

6. Gastritis submucosa—gastritis and enteritis and colitis.

7. General pathology of acute infectious disease. Swollen spleen, fatty degeneration and cloudy swellings of muscles, especially the heart, liver and kidneys. Bacteria involved—streptococcus pyogenes usually (Bumm).

Treatment—If a case of septicemia develops from a parametritis or vulvitis or endometritis, there is little to change in the treatment.

If the case shows from the start that it is a sepsis—whatever you do must be done immediately. No waiting till tomorrow. If the infection has already gotten a foothold, as a parametritis or lymphangitis, it is not possible to abort it. If, however, it is simply a severe form of absorption fever, due may be to a clot or a necrotic piece of placenta, the treatment has a better outlook. Therefore, in almost all cases where from the start you can recognize the gravity of the infection, a careful disinfection of the genital tract is attempted.

1. Remove retained placenta, or membranes. Never use the curette, always the finger. Care and antisepsis.

2. Disinfectant uterine injection, 1% lysol before and after. Bichloride is dangerous in puerperal cases because the vagina is robbed of epithelium, and are usually dangerous in anemia and Bright's disease. Do not use permanent uterine irrigation. Symptoms of peritonitis contra-indicate all local treatment.

3. Give ergot and hydrastis. Ice-bag to uterus.

4. For the peritonitis, opium, rest, ice.

5. Alcohol and diet.

6. Cool baths, when there is no peritonitis or parametritis; cool packs to reduce fever. No coal tar antithermics.

7. Extirpatio uteri. Doubtful utility.

8. Opening posterior cul de sac and packing pelvis with iodoform gauze.

PYEMIA.

It means literally pus in the blood which is not really the case. It is the third of the fever processes I mentioned, and occurs sporad-

ically. In the epidemics of puerperal fever, pyemia sometimes occurs, while septicemia forms the majority of the cases. Pyemia was already defined as that condition in which there are discharged into the blood from a locus of infection, bits of clot or pus microbes which find lodgment in various parts of the body, producing abscesses there.

In pyemia infection takes place through the veins, therefore it is more common after placenta previa, and after manual removal of the placenta. In septicemia the process is usually of the lymphatics.

The germs involved are the usual pus germs, but there may be mixed infection, as in septicemia. The process is often designated metrophlebitis. Sometimes a case that begins as a septicemia, becomes more chronic, running under the picture of a pyemia; this, too, without localization of pus in the distant organs.

Findings—These are uterine phlebitis and periphlebitis, purulent thrombi in the veins of the placental site, and the pampiniform plexus, which sometimes extend to the cava. Pieces sometimes lodge in the lungs, causing bronchopneumonia, or, if minute, pass through and get to the liver, spleen, and kidneys, pleura, joints, serous membranes in general. Also the thyroid, the brain, the eye, resulting in panophthalmitis; endocarditis.

The occurrence of an embolus and infarction is usually shown by a chill, but not all chills indicate formation of embolus.

Symptoms—Begins usually in the second week, unless the process sets in, in the course of a colpitis, endometritis, or pelveo-peritonitis. The patient usually has not felt well. Has a high pulse and a little fever. Rigor, often severe, sometimes lasting an hour, which may be repeated; as many as 70 rigors have been reported. These do not necessarily mean emboli. The severer forms of infection have few chills, and some cases occur without chills at all.

Fever rises directly and quickly, perhaps to 106 degrees F. After this a sweat occurs and the patient sinks into a collapse, temperature 95° F. Temperature is now irregular, around the normal, till another chill and fever occur. The pulse goes with the fever, unless an embolus occurs in a vital organ. Between attacks, unless they are frequent, the patient feels well. No euphoria like in sepsis. The fever presents a jagged curve with or without the infarcts.

Symptoms of infarcts are—

a. Lungs. Cough, stitch in side, bloody, sometimes purulent, expectoration, dyspnea, pleurisy, or even, rarely, dullness and signs of pneumonia.

b. Subcutaneous connective tissue. Anywhere but especially the thighs. Pain, redness, swelling, fluctuation. This abscess may "localize" the infection, and the case recover at once. Has been imitated in treatment by injecting turpentine.

c. Joints. The usual signs of acute arthritis. The whole joint.

May be disorganized and permanent anchylosis result. Knee most common but no joint exempt.

d. Panophthalmitis. Disorganization of the eye-ball. Thyroiditis metastases in the brain, etc., give the symptoms characteristic of these localizations.

The thrombosis of the pampiniform plexus extends sometimes to the vena cruralis with occlusions of same and resulting edema of the thigh and leg. This is one form of phlegmasia alba dolens.

The course of the disease is protracted, and the patient may expect a long invalidism, extending over months or even years.

Blood—The blood changes. Bacteria are sometimes found in the blood. If they should be found during a septicemia the case is usually fatal. Leucocytosis. Neutrophilia present. Differentiated thus from typhoid, where there is leucopenia. No Widal reaction in sepsis.

Diagnosis—The diagnosis is usually easy, from the course of chills, fever and emboli. Abscess in the pelvis presents similar symptoms. Examination reveals no mass in pelvis. Rarely feel thickened broad ligaments.

Prognosis—Better than septicemia. The more chronic the disease, the better the prognosis as to life, the worse as to health (arthritis, many abscesses, hectic, amyloid).

The shorter the disease the worse the prognosis as to life usually, and the better the prognosis as to general health later. Give guarded opinion because the cases at no time are out of danger. The severity of the case depends on the virulence of the germ, the resisting power of the patient and the localization of the emboli, i. e., the physiologic dignity of the structure involved, e. g., if in the skin, joints, even the pleura, good. If in the brain, lungs, heart, liver, kidneys, bad. Much depends on the possibility to drain the abscess.

Treatment—Treat the chill—heat, hot drinks, stimulation. For the fever, do nothing,—it goes down soon.

Rest to prevent thrombi breaking loose. Treat metastases on purely surgical principles. Nourishment important, as the disease is protracted. In 1894 Sippel (c. f. g. 1894, No. 28, and 1902, No. 50) advised extirpation of uterus and ligation and removal of thrombotic veins. Trendelenberg resected hypogastrium and spermatic plexuses.

Narcotics for pain. Must use morphine in bad cases. No specific treatment. The serum of Marmorek of doubtful utility. Prevent bedsores, which are very prone to form. Salt solution by hypodermoclysis good, also by prolonged rectal irrigation. Nuclein of doubtful value, ditto Credè ointment.

SEPTIC ENDOCARDITIS.

Usually complicates a septicemia but may occur after a mild local infection, or even without demonstrable local disease. Due to

infection of the valves, oftenest of the left heart with ulceration of same, and is marked by the presence of miliary embolic abscesses in the brain, liver, kidneys, etc. An endocardium that is already diseased is more prone to infection. Chlorosis seems to favor it, too.

Symptoms—Severe rigor, high and continuous fever, very rapid pulse, cerebral symptoms, muttering delirium, stupor, or even acute delirious mania. Sometimes symptoms of meningitis. Retinal hemorrhages in 80½ (Litten). Diarrhea. Hemorrhage under skin, scarlatiniform eruptions, or blisters. Disease lasts 10 to 28 days. Often appears like typhoid. Has roseola, enlarged spleen and tongue.

Heart findings usually equivocal. Sometimes sudden death.

Diagnosis—This is not easy. Absence of local cause for the high fever and rapid pulse. Severe sickness, marked nervous symptoms, retinal hemorrhages, repeated chills without determinable emboli.

Prognosis—Is bad.

Treatment—Symptomatic.

PHLEGMASIA ALBA DOLENS.

This term is rather loosely used to express three different pathological states:

1. A pelvic cellulitis which extends to the connective tissue under Poupart's ligament, and then involves the upper third of the thigh,—the real phlegmasia alba dolens.

2. A thrombosis of the femoral, or iliac vein, which causes stasis and edema of the leg and thigh—simply mechanical.

3. A phlebitis occurs, either from a neighboring cellulitis, or from extension from the inflamed veins of the uterus, through the pampiniform plexus.

I. The first form, to which the name properly belongs, is only the extension of a pelvic cellulitis up and out of the pelvis and down the thigh. The swelling first appears under Poupart's ligament, and sometimes limited to the upper third of the thigh.

II. The causes of primary thrombosis of the crural and femoral veins are, stasis of the blood in the legs, which may cause thrombosis even during pregnancy; the muscular rest after labor; the slow circulation in the distended veins; the amost hyperinlotic condition of the blood (especially after large hemorrhages); pressure on the veins by pelvic exudates; marasmus after long febrile diseases, called marantic thrombosis.

III. *Phlebitis*—This may come from extension of the inflammation of the veins of the uterus along the veins, or from a neighboring cellulitis by extension of the inflammation through the veins, e. g., the patient has a crural cellulitis, the vein becomes inflamed and therefore thrombotic. This may be reversed, sometimes a thrombo-phlebitis leads to a cellulitis, or a simple thrombosis becomes infected and inflammation results. Sometimes emboli are detached from the veins and lodge in the heart and lungs, which may be fatal. If infected they produce the clinical picture of pyemia.

Symptoms—The symptoms of crural cellulitis are those of a primary cellulitis (parametritis), plus those of cellulitis of the upper third of the thigh.

Sometimes the intra-pelvic symptoms are mild and, therefore, overlooked. Patient has fever, high pulse, pain in the groin and thigh. The leg cannot be moved. The groin becomes tender, swollen; sometimes red, but usually whitish, edematous; sometimes there are blisters. The leg is hard, and does not pit easily but the pitting stays longer than with simple edema. The swelling may be limited to the upper third or half of the thigh, but if the veins are involved and thrombosis occurs, the foot begins to swell and soon the whole limb is large, white and puffy; therefore, the old appellation "milk leg." It was thought to be a milk metatasis. In 10 to 14 days the inflammation usually subsides and the edema begins to go down. But it may be chronic and the patient has to wear a rubber stocking, or it reappears when the patient is on her feet a good deal.

In the mechanical form of thrombosis there is no fever. The swelling first appears on the foot, the pulse is rapid (without fever), Mahler's sign, the pain is not so marked, the thrombosed vein can often be felt, as hard, tender, knotty cord, and the patient does not feel ill.

In the thrombo-phlebitic form we have the same symptoms and findings as in the last, plus the symptoms of fever, of infection.

Prognosis—Good, but sometimes an abscess forms which may burrow all through the thigh or even be fatal. May be bilateral, which clouds the prognosis.

Treatment—Rest for the leg in a slightly elevated position. No massage, except late in the case to favor resorption of chronic edema. No movement, especially if there is thrombosis, for several weeks, till the clots are firmly organized. Danger of embolism. Locally, in the cellulitic variety, wet boracic dressing for several days, then simple protection. Watch carefully for bed-sores. Otherwise symptomatic treatment.

OTHER INFECTIONS.

There are other puerperal infections, e. g., erysipelas, beginning in the genitals, true diphtheria of the genital tract, tetanus, which seems to be commoner after abortions, tuberculosis and gonorrhea. This last is being more and more recognized as a cause for puerperal infection. It occurs later in the puerperium, usually after the third week, but may occur earlier. It causes endometritis, salpingitis, ovaritis, leading to pyosalpinx and ovarian abscess or even pelvic peritonitis. It may or may not be accompanied by the pus germ, and is dangerous also alone.

Principles of Treatment—Before leaving the subject let us sum up the principles of the treatment of puerperal infection.

Having determined that the fever comes from the genitalia, you must settle the following questions: (1) Is the fever from something retained and decomposing in the uterus or vagina, e. g., pieces of placenta, blood clot, lociometra, lochiocolpos? (2) Is the infection still in the genital tract, or is it already beyond the surface, or has it indeed become general? (3) What anatomical structure is mostly involved, or does the infection line the whole parturient canal? (4) What is the nature of the infection, pus germs, saprophytes, bacterium coli cummunis, diphtheria, etc.

1. If one is convinced that there is something in the uterus causing serious symptoms, especially fever with high pulse, remove it gently with the fingers, preceding and following with an antiseptic douche.

2. When the parturient canal is empty leave it alone, give ergot; opium for the pain, sleep, peritonitis; support the patient's strength in every way.

3. When the infectious process has become localized in the uterus or adnexae, or an abscess forms which continues as a focus from which systemic infection proceeds, surgical interference is indicated.

The treatment of puerperal infections has developed another and important aspect in the last few years, due to the introduction of serum therapeutics. We have now an antistreptococcus serum, and the latest is an antistaphylococcus serum. While a large proportion of the puerperal fevers are due to the streptococcus, not all are, and, therefore, the routine use of this serum is irrational. The exact nature of the cause being determined, the serum may be exhibited. The latest reports are encouraging. It is safe, and, therefore, frequently used. Collargal, intra-venously, uncertain.

In cases of puerperal tetanus the anti-tetanus serum should be used under the same conditions as govern its exhibition in general surgery.

In diphtheria, affecting the puerpera in any part, the antitoxin

should be exhibited and prophylactic injections also. One must not confuse diphtheroid patches, which may occur in any infection of the genitals, with true diphtheritic exudates.

There are several agents which are strong auxiliaries. Of these, saline infusions may be given first place. A quart of 7-10% salt solution injected under the breast each day, and especially if there is collapse, may save an otherwise hopeless case. Bosc, Claisse, Pozzi, have drawn particular attention to this line of treatment. J. G. Clark, of Baltimore, records a very successful result in a severe puerperal fever. Rectal irrigation with salt solution continued for 1 or 2 hours may help, too. Runge recommends large doses of alcohol combined with cool baths. The latter ought to be supplanted by cool sponging to avoid the exertion and disturbance of the patient. Regarding alcohol, opinions differ. I would not put my faith in it, though I do not believe it harmed those cases to which it was given. Give no more than ℥ii daily.

Quinine is not a specific in puerperal infections. Its value in fevered conditions is generally recognized, and this is due to its powers as a general tonic.

In conclusion, reference may be made to a class of cases where on the third or fourth day the patient is seized with symptoms resembling puerperal infection, but which are due to constipation, and which subside on free movement of the bowels. These cases are not fully understood; they may be serious, and if an infection of the parturient canal with the bacterium coli communis takes place, may be fatal. The French call them pseudoinfections. Their prevention requires attention to the bowels before labor and a laxative in the first two days after confinement.

THE BREASTS.

The most common trouble with the breasts is the lymphatic and glandular engorgment that occurs, especially in primiparae, when the milk comes in. The breast is large, hot, tense, painful, shiny, the lobules enlarged, the nipple flattened; there is often a detached lobule in the axilla which also is enlarged and painful, so that the patient cannot bring her arms to the sides. The veins are distended. *There is no fever.* The skin is edematous and pits on pressure, the child cannot grasp the nipple and the patient often becomes highly nervous from the condition. This swelling is not due to the presence of milk, but to lymphatic and vascular engorgment. There is a very little milk already formed in the breasts at the beginning of nursing, but most of it is made during the time of the nursing by the stimulation of the gland. Thus, there is no reason to "massage the milk out." The rubbing stimulates the breasts to make milk and the engorgement is, therefore, increased.

Later, in the lactation period, and in multiparae, at the times of the nursings, the milk begins to form, from habit, and the milk in certain quantities runs from the breast. But this is not the rule, and therefore is not the guide to practice.

Treatment—Give a saline laxative, reduce the amount of fluids taken, bind the breasts tightly with an evenly applied binder. Have the nurse (or do it yourself), by even pressure with the outspread hands, press the breasts against the chest wall so as to reduce the tumefaction. This is not a massage, but just an evenly distributed pressure, pressing the lymph out of the breasts just as we would keep pressure on a contusion to reduce the swelling. Then an ice-bag may be applied to each breast. Some women prefer warmth, so in these cases great good will be accomplished with a wet boric dressing (2%) covered with oil silk or rubber tissue and held with a firm binder. Reduce the frequency of the nursings, do not use the breast pump, and do not massage. If massage is practiced, the rubbing should be toward the periphery of the gland, not toward the nipple. See "Obstetrics for Nurses," page 275.

The Nipples—These are often a source of trouble, and though apparently insignificant, may lead to very serious results, namely, discontinuance of the nursing and abscess of the breast, even death from septicemia. Therefore, pay close attention to the nipples. They may be retracted, mulberry shape, bifid, polypoid, etc., all of which favor the formation of cracks and fissures. These lead to infection, or they render nursing so painful that it must be given up, which is a serious matter for the baby. Sometimes, without any apparent cause, the nursing is too painful, so that it has to be given up. These cases usually occur in neurotic individuals, or where there is not enough milk. The nurse should watch the nipples carefully. If there is pain in nursing, inspect the nipple with a magnifying glass. At the first appearance of a blister or a crack, redouble antiseptic precautions. Put on a Wansbrough's lead nipple shield and use a glass nipple shield for nursing. If this treatment is not quickly successful, touch the crack with a 2% $AgNO_3$ sol. and let dry. Then lead shields again. Succedanea, are 4% boric acid in glycerine, tr. benzoin comp.,—all allowed to dry in well. Rarely 2½% $AgNO_3$ in collodion may be used. Belladonna ointment and a host of other remedies fail and succeed in isolated cases. Infection of the breast not seldom follows a crack or blister, therefore, careful.

Mastitis—There are several forms. A small abscess forms in the areola, due to infection of a tubercle of Montgomery. A cellulitis starts from the nipple and spreads under the skin, like a cellulitis anywhere. Important as to diagnosis, the treatment is like that of cellulitis in general.

The most important cases of mastitis are those—1st, where the infection proceeds down the milk tubules, producing a paren-

chymatous inflammation of the gland; 2nd, where the infection travels alongside the tubules to the connective tissue around the lobules producing a perilobular mastitis; this can seldom be distinguished clinically from the parenchymatous; 3rd, where the infection goes deeply but passes the gland proper and there is a retro-mammary cellulitis, with pus formation in the deep connective tissue.

Cause—Infection, which may be brought in from the outside; from the woman herself, lochia, etc.; from the baby, navel, ophthalmia, mouth, thrush; from the gland itself. There are staphylococci in many breasts and sometimes streptococci in the milk ducts, waiting for favorable conditions to enter the lymph spaces. Such favorable conditions are cracks, fissures, bruises from injury, either accidental, or from massage, pumping the breasts, prolonged and forced efforts at nursing when there is no secretory activity in the gland. It is doubtful if so-called milk stasis, or "caking" of the breasts itself, will cause mastitis or even favor infection, from the germs present, unless the breast be injured by massage, or attempts to force milk out of the congested lobe.

Mastitis may occur at any time during pregnancy and the puerperium, also but rarely, in the non-puerperal state. Most often in the second week post partum. Primiparae oftener than multiparae. One attack predisposes to another in the next lactation. Begins with pain in the breast, especially during the nursing. One lobe is tender, hard, swollen, sometimes a litle reddened; the secretion of milk in that breast is less, it sometimes "cakes," which gives rise to the thought that the caking causes the mastitis, when really the infection is the cause of the caking.

There is a slight feverishness, and accelerated pulse. In the presence of these symptoms, especially if there is a crack you may diagnose an incipient mastitis, and treatment is now efficacious in aborting it. After a few days of these symptoms the patient has a chill, more or less severe, a sudden rise in temperature and pulse, sometimes 104° F. and 120 to the minute. All the symptoms of high fever. Pain in the breast which may be at a small spot or all over the breast. Swelling of the lobe, tenderness, later redness.

If nothing is done the gland breaks down, the skin becomes adherent to it and abscess forms and breaks, more or less of the whole breast being disorganized. The fever is high till pus forms, then irregular till it is evacuated, then normal temperature unless drainage is bad, or the other breast begins to inflame. If the gland structure alone is involved may be able to press out pus from the nipple, but this must be done gently. Rare.

If a retro-mammary abscess forms, the constitutional symptoms are severe and threatening, general sepsis may occur and the condition should be early recognized and treatment radical.

Prognosis—With proper treatment of a mastitis, i. e., if it is

recognized early, nearly every case can be aborted. If not, then many cases will go on to abscess. The breast may be riddled with abscesses and suppuration go on for many months till the patient is much pulled down. With proper treatment this can also be prevented.

Diagnosis—Usually easy, but with severe constitutional symptoms and slightly marked local findings the idea of a late puerperal infection may come up. Sometimes the two may go together.

Treatment—If you see a mastitis threatening, or if the patient has had the chill with fever:

1. Take baby from both breasts absolutely.
2. Give the patient a bottle of liq. Magnesii citratis, and repeat in six hours, if necessary. Reduce liquids in diet.
3. Wash breasts with 1-1000 Hg Cl2, put on a *tight* breast binder.
4. Put two ice-bags on each breast, and keep the breasts *cold* till 10 hours after the temperature is normal.

In a few hours the temperature begins to fall and in 16 hours may be normal. Swelling goes down. A little tenderness may remain. If after 48 hours of ice, there is no effect you may count on suppuration resulting. If the temperature goes down to normal for 10 hours, remove the ice-bags, put on a binder. The baby may nurse after expressing a little milk from the nipples. Begin tentatively, watching pulse and temperature. When suppuration is inevitable, remove the ice and put on a wet boric dressing. Surgical treatment now in order; remove the lobe infected. This is the best treatment, as it prevents prolonged suppuration. If impossible to do this, make a long, radiating incision into the infected lobe and curette out all the diseased gland thoroughly, breaking up all the various cavities into one, then pack with gauze and let it heal up from the bottom. Be thorough as the healing will then be shorter. The importance of making radial incisions to avoid the milk ducts was known to the Hindoos 160 years A. D. See Ayur Veda of Susruta. Kossman All. Gyn., page 10.

Operate as soon as you know there is pus. Bier's treatment of mastitis is good.

Patient must give up nursing entirely as the stimulation keeps up secretion in the sick breast; further, the child may get sepsis. Get the patient up as soon as possible and out of doors, to build up her strength.

Agalactia—Scantiness of milk is not uncommon, also the milk not agreeing with the child. In some cases it really acts like an irritant poison, and may lead to digestive disorders resulting fatally.

The causes of a scanty milk supply are, general ill-health, maldevelopment of the breasts, either congenital, from abscess of the breasts, or from compression by vicious dressing, insufficient stimulation, i. e., half-hearted attempt at lactation, nervous influences (rare and dubious).

Treatment—Protect the breast from girlhood by proper hygiene, mental and physical. During pregnancy, allow free development of the glands. Don't give up nursing too soon, perhaps the patient may supply half the baby's food. Of the various stimulants to the milk seretion few are of real value.

Massage t. i. d., gently, so as not to injure the breast and thus cause abscess. When patient can do so, cool baths with friction of the body and light friction on the breasts. Let a strong baby nurse frequently.

Of medicines there are none of service.

Food—Liquids of all kinds, especially milk. Oatmeal gruel, barley gruel, chocolate, oyster stew, all useful.

Malt of no use. Milk gets fatty and dries up, while the patient aiso puts on fat.

If the patient finally suceeds in giving milk, the supply is usually insufficient and sometimes not good, so that all methods of forcing the secretion are unsatisfactory. Should she begin to complain of pain in the breasts with drawing pains running around to the shoulder blades, this is an indication that lactation is a drain on her system and it should be discontinued.

INDEX.

A

Abdominal Pressure 122
Abortion 309
  cause of, maternal.....311
  causes of, ovular.....310
  changes in ovum.....320
    lithopaedeon 320
    mummification 320
    septic infection 320
  classification of 314
  definition 309
  diagnosis 315
  frequency 309
  from retroflexion 285
  habitual 312
  incomplete 318
  indications for 267
  induction of 267
  instruments for 318
  in nephritis 266
  mechanism of 313
  placenta previa in.....311
  prognosis in 316
  symptoms 314
  technique of treatment.....317, 319
    general 319
    incomplete 318
    inevitable 317
    threatened 316
  time of occurrence.....309
Accidental hemorrhage....302, 344, 346
  causes 302, 344
  treatment 347
Acephalia 296
Agalactia 474
Albuminuria 261
Allantois 57, 58
Amnion 57
  anomalies of 304
  diseases of 304
Amniotic fluid 58
Amniotitis 304
Anaesthetics in labor.....157
  choice of 159
  conditions 158
  indications 158
  methods 159
Anemia 265
  treatment 266
Anencephalus 296
Anomalies of—
  amnial liquor 304
    oligo-hydramnion 306
    poly-hydramnion 304
      acute 305, 306
      clinical character 305
      course 306
      diagnosis 305, 306
    amnion 304
  cord, umbilical 307
    coiling 307
    hernia 308
    short cord 307
    syphilis 308
    torsion 308
    true knots 308
    velamentous insertion 308
  mechanism—
    breech presentations 379
    face presentations 414
  passages and passengers.....326
    abnormal resistance 326
    contracted pelvis 329, 334
      effect on labor.....331, 334
      dangers 331
    flat pelvis 330
      diagnosis 332
      prognosis 332
      prophylaxis 333
      treatment 332
    membranes, tough 328
    obstructions 329
      stenosis of cervix.....326
      stenosis of vagina.....327
    tight perineum 328
  placenta 302
Antisepsis—
  in labor 449
  in puerperium 238
Articles needed in labor.....103
Asphyxia Neonatorum 368
  causes 369
  diagnosis 371
  symptoms 369
  treatment 372
Attention to baby.....244
Auxiliary forces in labor.....122

B

Baby—
  at birth 9
  care of at birth.....172
  care of later.....244
  sexually 9
  weight 9
Bag of waters.....154
Ballottement 79
Bandl's Ring—theory 38
Barnes' bag or dilators.....438
Bathing in pregnancy..... 98
Baudelocque's method 415
Bladder irritability 71
Bladder in Puerperium.....239
Blood—
  changes in pregnancy.....46, 268
  of fetus 64
  of new born.....231
  treatment 269

Bones—changes in 50
Bowels in puerperium 240
Breasts—care of 100
care during puerperium.....240
changes in pregnancy..... 44
changes in puerperium.....220
diseases of 471
Breech Presentation 184
causes 185
clinical course 188
manual aid 191
mechanism 186
mechanism unusual 192
positions 184
prognosis 189
treatment 190
Brow presentations 183
mechanism 183
plastic changes 184
prognosis 184
treatment 184

C

Caesarean Section 425
conditions 427
indications 426
laparo-elytrotomy 429
on dead or dying woman.....429
Porro's operation 429
preparation of patient.....428
prognosis 428
Sanger method 426
technique 428
vaginal method 426, 430
Care of baby.....172, 244
of eyes of infant.....163, 167
Cause of first respiration.....164
Cephalic version 405, 412
conditions 412
indications 412
methods 405
Champetier de Ribes, bag.....438
Changes in breasts.....44, 220
fetal head in labor.....144
fetus during labor.....113
genitalia 218
pregnancy in—
abdominal walls 43
appetite 51
blood 46
blood vessels 35
breasts 44
cervix 37
digestive tract 51
functions of uterus..... 42
Hegar's sign 36
intestines 52
ligaments 40
liver 52
lower uterine segment..... 37
lymphatics 35
maternal organs 46
muscle 34
nerves 53
nervous system 52
nutrition 52
ovaries 40
pelvic con. tissue..... 40
pelvic floor 41
pelvic joints 42
perineum 41
peritoneum 40
stomach 52
taste 51
tubes 40
urine 49
uterus—shape 36
vagina 41
vulva 41
puerperium 216
vagina in labor.....218
Child growth 65
Chloral in eclampsia.....261
Chloroform in eclampsia.....261
Chorion, diseases of.....299
Circulation of fetus..... 63
Climacteric 19
Clitoris—tears of 212
Coitus in pregnancy..... 98
Colostrum 221
Colpeurysis 438
Complications of labor
on part of child—
(see asphyxia) 368
on part of mother—
placenta previa (vide).....337
post partum hemorrhage.....348
causes 349
diagnosis 350
treatment 351
premature detachment of
placenta 344
causes 344
diagnosis 346
symptoms 345
treatment 347
puerperal hemorrhage 336
Conception 21
time 29
site 22
Conduct of labor.....148
preparation of patient.....150
Conduct of Puerperium.....237
antisepsis 238
bladder 239
bowels 240
breasts 240
diet 238
Conduplicatio Corpore 203
Contracted pelvis 329
Contractions, uterine 110
Contraindications to nursing the
baby by the mother.....242
nursing the baby.....241
patient's toilet 243
Convulsions (vide Eclampsia).....354
Cord—
anomalies of 307
coiling 307
hernia 308
insertion 57, 58
knots 58
short cord 307
syphilis 308
torsion 308
true knots 308
tying of 166
velamentous insertion 308
Corpus luteum 24
Crede's method 168
Craniotomy 421
conditions 422
indications 421
technique 423

D

Death of fetus....309
of new born (vide asphyxia)....368
Decidua, diseases of....290
endometritis....290
diagnosis....292
symptoms....291
treatment....292
varieties....290
syphilis....293
Decidua reflexa.... 32
serotina.... 32
vera.... 32
Deformities of pelvis....329
varieties....330
Delivery of head....161, 162
of shoulders....163
Detachment of placenta—
manual....351
premature....344, 376
Determination of sex.... 27
Diagnosis of life and death of fetus 94
multiparity.... 93
pregnancy.... 68
first trimester....69, 75
second trimester....77, 84
third trimester.... 86
puerperium....228
Diagnosis, presentation and position 103
Diameters of pelvis....124
of fetal head....133
Diet in pregnancy.... 96
Dilatation with bags....438
Dilators, Barnes'....438
Discus proligerus.... 11
Diseases of breasts....471
Diseases during pregnancy—
accidental....269
gonorrhoea....272
heart disease....279
sepsis....271
syphilis....274
tuberculosis....272
Diseases of ovum....293
external causes....295
teratology....294
Diseases of placenta and membranes....301
atelectasis....303
calcification....303
cysts....304
hemorrhage....302
edema....303
placentitis....303
syphilis....303
Diseases of pregnancy....249
digestive disturbances....258
gingivitis....257
hyperemesis gravidarum....250
kidneys....261
acute nephritis....263
Bright's disease, varieties....261
causes of disturbance....262
ptyalism....256
toxemia....258
vomiting of pregnancy....249
Diseases of puerperium....441
puerperal infection....441
bacteriology....446
classification....450
clinical forms....452
endocarditis....467
endometritis....453
fever from retained matter....456
etiology....445
methods of sterilization....449
parametritis....457
perimetritis....460
phlebitis....469
phlegmasia alba dolens....468
prophylaxis....448
pyemia....451, 465
sapremia....451
septicemia....451, 463
treatment....465, 470
vaginitis....453
vulvitis....452
Diseases of uterine decidua....290, 292
Displacements of extremities....205
causes....206
Displacements of uterus....280
causes....280
late in pregnancy....280

E

Early expression....169
Eclampsia....354
attack....358
Caesarean section in....363
clinical course....358
diagnosis....360
elimination....363
etiology....355
exciting causes....355, 356
forceps in....391
influence on labor....359, 361
influence on pregnancy....360
morphine in....361
mortality in....360
pathological anatomy....357
predisposing causes....355
prognosis....359
theories....355
treatment....360
Ectoderm.... 32
Engagement of nurse....102
Episiotomy....162
indications....162
Ergot in labor....170
Ergot in labor....352
Pajot's law....352
Errors in posture....205
displaced extremities....205
causes....206
prolapse of cord....207
diagnosis....207
prognosis....208
treatment....208
prolapse of feet with head....206
Examination of patient....151
Exercise in pregnancy.... 97
Expression, early....169
External wandering.... 26
Extremities, displacement of....205
causes....206

F

Face Presentation....178
Baudelocque's method....415
causes....178
changed to vertex....414

diagnosis 179
findings 179
frequency 178
management of 415
mechanism in 179
mento dextro 179
methods 415
plastic changes 182
posture 178
primary 178
prognosis 181, 414
secondary 198
Thorn's method 415
treatment 182
varieties 178
version in 415
Female pronucleus 12
Fetal envelopes, diseases of.....299
etiology 300
prognosis 301
treatment 301
Fetus—
anomalies of 296
at term..... 61
blood of 63
changes during labor.....116
changes in head.....144
changes of posture.....414
circulation of 63
double monsters 297
nutrition of 65
physiology of 63
placenta functions 64
single monsters 296
Forceps—
application of 393
conditions 390
definition 388
description 388
function 389
high forceps 400
conditions 401
indications 401
preparation 401
technique 402
history 386, 387
in deep transverse—
arrest 395
technique 396
indications 390
in face presentation.....399
conditions 399
indications 399
preparation 399
technique 399
in unusual mechanisms of occipital presentation 395
low forceps 393
technique 393
preparation 392
prognosis of operation.....402
slipping of forceps.....403
causes 403
dangers 403
treatment 403
Functions of corpus luteum..... 25
Functions of placenta..... 64

G

General Conditions of Child.....232
Graffian Follicle 11
Growth of Child.....65, 233

H

Heart disease in pregnancy.....277
during labor 278
in puerperium 278
prognosis 279
treatment 279
Hegar's Sign 36
Hemorrhage
accidental 302, 344, 346
from circular sinus.....348
from cord 348
from dead ovum.....439
from placenta previa.....339
post partum 348
causes 349
diagnosis 350
treatment 351
premature detachment of placenta344
Hygiene of Pregnancy..... 96
baby 99
care of breasts.....100
coitus 98
diet 96
dress 96
exercise 97
general rules 96
mental occupation 99
urine examination 100
vaginal douche 99
Hygiene of Puerperium.....237
antisepsis 238
bladder 239
bowels 240
breasts 240
diet 238
care of child (vide care of).....244
attention to bladder.....245
attention to bowels.....245
bath 244
care of eyes.....245
dressing cord 244
nursing 241
nurse's duties 237
nursing 241
nursing contraindicated 242
pulse 225, 243
temperature 224, 243
toilet 243
Hyperemesis gravidarum 250
causation 251
diagnosis 253
prognosis 253
symptoms 250
treatment 254

I

Icterus neonatorum 233
Induction of labor, artificial.....439
after treatment 440
indications 439
methods 439
prognosis 440
Induction of labor, premature.....433
conditions 433
indications 435
methods 437
prognosis 438
Infant, care of.....244
attention to bladder.....245
attention to bowels.....245

bath 244
care of eyes 245
dressing of cord.....244
nursing 241
nursing contraindicated.....242
Internal wandering of ovum..... 26
Intestinal tract—
in new-born 232
in pregnancy 52
in puerperium 228
Involution 213, 215
blood vessels in 215
causes 215
changes in endometrium.....216
changes in serosa.....216
lochia 216
measurements 214
Irritability of bladder..... 71

J

Joints, pelvic in pregnancy.....269

K

Karyokinesis 12, 24
Kidneys in pregnancy.....100
examination of urine.....100
Kidneys in Puerperium.....226
albumen in urine.....226
examination of urine.....227
peptones in urine.....227
specific gravity of urine.....227
sugar in urine.....227
Urea 227

L

Labor—
anaesthetics in 157
antisepsis in 449
articles needed 103
causes—
fetal 107
maternal 106
changes—
in fetus 116
intest. tract 118
maternal due to.....117
mental condition 118
pulse 118
respiration 118
temperature 118
clinical course 108
in twin labors.....193
complications of.....336, 368
conduct of 148
delivery of head.....161, 162
delivery of shoulders.....163
face presentation—
induction of, artificial 439
induction of, premature.....433
mechanism 120
abdominal pressure 122
auxiliary forces 122
changes in fetal head.....144
diameters of pelvis.....123, 124
in brow presentation.....183
in face presentation.....179
in occipito left anter.....138
in twins 194
in unusual 173, 174
course 174
termination 174
treatment 177
nervous 137
O. L. A.....138
passages 123
pelvis, bony 123
planes.....124, 125, 126
powers 120
separation of placenta.....146
separation of membranes.....147
shoulder 141
unusual of head.....173, 174
course 174
termination 174
treatment 177
uterine contractions 120
what one feels.....141
nervous mechanism 137
pathology of 321
anomalies of uterine action.....323
atony of uterus.....324
physiology of 105
causes of labor.....106, 107
def. of labor.....105
normal 105
pathological 105
uterine irritability 107
powers of 322
prognosis 120
protection of perineum.....160
stages 108
treatment—first stage.....159
second stage 159
third stage 168
twins 193
urine 119
Laceration of Perineum.....208
degrees 208
treatment 210
Lactation 220
Lightening 90
Liquor Amnii 58
sources 59
uses 60
Liquor Folliculi 11
Lochia 216
quantity 218
source 218
Lungs in pregnancy..... 49
ruptured uterus.....364
causes 365
diagnosis 367
symptoms and signs.....366, 367
treatment 367

M

Mammary glands 71
Manual aid 191
Manual removal of placenta.....351
Mastitis 472
cause 473
diagnosis 474
prognosis 473
treatment 474
Maternal changes 117
Maternal impressions.....98, 99
Measurements—
of fetus 133, 134
of pelvis 101
Mechanism of labor.....120
abdominal pressure 123
auxiliary forces 122

changes in fetal head.....144
diameters of pelvis.....123, 124
in brow present.....183
in face present.....179
in O. L. A.....138
in twins.....194
in unusual forms.....173, 174
course.....174
termination.....174
treatment.....177
nervous.....137
O. L. A.....138
passages.....123
pelvis, bony.....123
planes.....124, 125, 126
powers.....120
separation of placenta.....146
separation of membranes.....147
shoulder.....141
unusual, of head.....173, 174
course.....174
termination.....174
treatment.....177
uterine contractions.....120
what one feels.....141
Membranes, separation.....147
Menopause.....19
synonyms.....19
Menstruation.....12
changes in uterus.....13
character of flow.....18
clinical aspect.....17
definition.....12
duration.....18
hygiene.....19
influences.....13
periodicity.....19
symptoms.....18
synonyms.....12
theories.....14, 16
Auvard.....16
Leopold.....13, 16
Pfluger.....14, 15, 17
vicarious.....20
Mental occupation.....99
Monsters—
monstra per defectum.....295
acrania.....296
anencephalus.....296
thoracogastroschisis.....296
monstra per excessum.....296
monstra per fabricam alienam.....296
diagnosis.....297
double monsters.....297
kraniopagus.....297
sternopagus.....297
treatment.....298
xiphopagus.....297
Morning sickness.....51, 70
Morphine in eclampsia.....361
Multiparity, diagnosis.....93

N

Nephritis.....264
abortion indicated in.....267
acute.....264
Bright's disease.....264
varieties.....264
prognosis.....266
treatment.....266
Nerves in pregnancy.....53
Nervous mechanism in labor.....187
Nervous system—
in pregnancy.....52
in puerperium.....228
Neuralgia in pregnancy.....53
New-born child.....230
blood.....231
general condition.....232
icterus of.....233
intestinal tract.....232
local changes.....235
pulse.....231
separation of cord.....235
skin.....233
temperature.....231
urine.....231
weight.....233
Nipples, diseases of.....472

O

Ovaries—
anatomy.....10
histology.....11
Ovulation.....10
definition.....10, 11
Ovum—
at term.....53
external wandering.....26
fertilization.....24
general description.....53
how gets into tube.....23
theories.....23
Operations, obstetrical.....375
antisepsis in.....449
Caesarean section.....425
conditions.....427
indications.....426
laparo-elytrotomy.....429
on dead or dying woman.....429
porro's operation.....429
preparation of patient.....428
prognosis.....428
Sanger's method.....426
technique.....428
vaginal method.....426, 430
extraction.....380
forceps.....392
application of.....393
conditions.....390
definition.....388
description.....388
function.....389
high-forceps.....400
conditions.....401
indications.....401
preparation.....401
technique.....402
history.....387
in deep transverse—
arrest.....395
technique.....396
indications.....390
in face presentations.....399
conditions.....399
indications.....399
preparation.....399
technique.....399
in unusual mechanisms of occipital presentations.....395
low forceps.....392

technique 393
preparation 393
prognosis 402
slipping 403
causes 403
dangers 403
treatment 403
induction of abortion 267
indications 267
technique 267
induction of labor, artificial....434
after treatment....440
indications 439
methods 439
prognosis 440
induction of labor, premature....433
conditions 433
indications 435
methods 437
prognosis 438
manual aid 376, 378
manual removal of placenta....351
mutilating operations on child....420
brachiotomy 420
cephalotripsis 420
cleidotomy 420
conditions 422
cranioclasis 420
craniotomy 421
decapitation 420, 424
embryotomy 420
exenteration 420
indications for 421
technique 423
placenta, removal 351
symphysiotomy 430
after treatment 433
conditions 431
indications 431
preparation 431
prognosis 433
technique 432
treatment of breech....379, 380
abnormal rotation 384
complications 383, 385
conditions 379
indications 379
scheme 386
Smellie Veit
technique 380
version 404, 412
Braxton Hicks....407, 410
conditions 411
preparation 411
cephalic 405, 412
conditions 412
indications 412
methods 405
pelvic 412
conditions 413
indications 412
podalic 406
Braxton Hicks....407, 410
Carl Braun 407
indications 406, 414
in head presentations....414
methods 406, 407
preparation 407
technique 408, 414
Scapula Dextra ant....410
Scapula Dextra post....410
Scapula Laeva ant....419

P

Passages 123
Passengers 132, 335
enlargement of shoulders....335
large head 335
measurements 133
Pathology of labor....321
anomalies of uterine action....323
atony of uterus....324
Pathology of Pregnancy....249
digestive disturbances 257
gingivitis 257
hyperemesis gravidarum....250
kidneys 261
acute nephritis....264
Bright's disease, varieties....264
causes of disturbance....262
ptyalism 256
toxemia 258
vomiting of pregnancy....249
Pathology of puerperium....441
agalactia 474
diseases of breasts....471
diseases of nipples....472
mastitis 472
puerperal infection (vide puerperal infect.) 441
Patient, examination of....151
preparation 150
Pelvic joints....124, 125, 127, 269
measurements 101
planes 124, 125, 126
signs 72
Pelvis 129
anomalies of 329
bony 123
contracted 329
flat 330
generally contracted....334
kyphotic 334
race influences 128
simple flat 330
Perineal body 131
Perineum—
episiotomy 162
indications 162
laceration 208
degrees 208
treatment 210
protection....158, 160, 161
Phlebitis 469
Phlegmasia alba dolens....468
Physics of abdomen....43
Physiology of—
fetus 63
blood 63
circulation 63
nutrition 65
labor 105
causes of 106, 107
definition 105
normal 105
pathological 105
uterine irritability....107
pregnancy 31
changes, general 31
changes, local 31
puerperium 213
general changes 223
Placenta—
anomalies of 302

clinical importance of....301
detachment, premature....344
diseases of....301
atelectasis....303
calcification....303
cysts....304
edema....303
hemorrhage....302
placentitis....303
syphilis....303
examination of....171
expulsion....147
Ahlfeld's method....171
conditions....170
Crede....169, 170
dangers....170
early expression....169
functions....64
manual removal of....351
previa....337
causes....338
clinical history....339
definition....338
diagnosis....340
etiology....338
hemorrhage....339, 344
prognosis....341
treatment....341
varieties....338
separation of....146
structure of....54
Position....134
Posture, errors in fetal....205
Posture of fetus (vide fetus)....414
prophylaxis....448
pyemia....451, 465
sapremia....451
septicemia....451, 463
treatment....465, 470
vaginitis....452
vulvitis....453
Powers of labor....121
Prediction of date of confinement....88
Pregnancy—
coitus in....98
decidual endometritis in....290
diagnosis in....68
diseases accidental to....269
gonorrhea....272
heart disease....277
sepsis....271
syphilis....274
tuberculosis....272
diseases incidental to....249
digestive disturbances....257
gingivitis....257
hyperemesis gravidarum....249
kidney....261
acute nephritis....264
Bright's disease, varieties....264
causes of disturbance....262
ptyalism....256
toxemia....258
vomiting of pregnancy....249
general rules....96
Hegar's sign....36
hygiene....96
bathing....98
care of breasts....100
coitus....98
diet....96
dress....96
exercise....97
general rules....96
mental occupation....99
urine, examination....100
vaginal douche....99
local changes....31
morning sickness....51, 70
neuralgia in....53
pathology of....249
physiology of....31
abdominal wall....43
blood....46
blood vessels....35
bones....50
breasts....44
cervix....37
changes, general....31
changes, local....31
digestive tract....51
fallopian tubes....40
function of uterus....42
in appetite....51
intestines....52
liver....52
lower uterine segment....37
lymphatics....35
maternal organs....46
morning sickness....51
muscle....34
nerves....53
nervous system....52
neuralgias....53
nutrition....52
ovaries....40
pelvic con. tissue....40
pelvic joints....42
pelvic floor....41
perineum....41
peritoneum....40
round ligaments....40
shape of uterus....36
stomach....52
taste....51
urine....49
utero-sacral ligaments....40
vagina....41
vulva....41
signs and symptoms—
first trimester....69, 75
second trimester....77, 84
third trimester....86
syphilis in....275
Preparation of patient....150
Presentation—
breech....184
causes....185
clinical course....188
manual aid....191
mechanism....186
positions....185
prognosis....189
treatment....190, 192
unusual mechanism....192
brow....183
causes....183
definition....183
diagnosis....183
mechanism....183
positions....183
prognosis....184
treatment....184
causes....136

- dehnition 134
- diagnosis 103
- face 178
  - causes 178
  - diagnosis 179
  - findings 179
  - frequency 178
  - mechanism 179
  - mento-dextro 179
  - plastic changes 182
  - posture 178
  - primary 178
  - prognosis 181
  - secondary 178
  - treatment 182
  - varieties 178
- frequency 136
- transverse 198
  - causes 198
  - clinical course 201
  - conduplicatio corpore 203
  - positions 199
  - prognosis 204
  - spontaneous version.....202
  - treatment 204

Prolapse of cord.....207
- causes 207, 416
- dangers 417
- diagnosis 207, 417
- prognosis 208
- treatment.....208, 417, 419
- umbilical 416

Prolapse of feet and hands....206, 415
- causes 206
- treatment 206, 415

Pubiotomy 430

Puerperal infection 441
- bacteriology 446
- classification 450
- clinical forms 452
- endocarditis 467
- endometritis 453
- etiology 445
- fever from retained membranes.456
- methods of sterilizing.....449

- parametritis 457
- perimetritis 460
- phlebitis 469
- phlegmasia alba dolens.....468

Puerperal state, pathology.....441
- agalactia 474
- diseases of breasts.....471
- diseases of nipples 472
- mastitis 472
- puerperal infection 441

Puerperium—
- attention to baby.....244
- blood 225
- conduct of 237
  - antisepsis 238
  - bladder 239
  - bowels 240
  - breasts 240
  - diet 238
- contraindications to nursing by mother 242
- diagnosis 228
- diseases of (vide puerperal state).441
- general changes 223
- intestinal tract 228
- involution 213, 215
- kidneys 226
- nervous system 228
- nursing the baby.....241
- patient's toilet 243
- physiology of 212
  - general changes 223
- pulse 225, 243
- skin 226, 241
- temperature 224, 243

Pulse—
- in labor 118, 225
- in puerperium 225, 243

R

Race influence on pelvis.....128
Respiration, cause of first.....164
Round ligaments 40
Ruptura Uteri 364
- causes 365
- diagnosis 367
- signs 366
- symptoms 366
- treatment 367

S

Salivation 70
Scapula Dextra anterior.....410
Scapula Dextra posterior.....410
Scapula laeva anterior.....409
Scapula laeva posterior.....409
Schroeder's theory 38
Sectio Caesarea 425
- conditions 427
- indications 426
- laparo-elytrotomy 429
- on dead or dying woman.....429
- Porro's operation 429
- preparation of patient.....428
- prognosis 428
- Sanger's method 426
- technique 428
- vaginal method 426, 430

Seminal fluid 22
Separation of cord.....235
- of placenta 146

Sex—
- determination of..... 27
- difference in 9

Shoulders, delivery of.....163
- presentation 199, 409
- treatment 409, 410
- version in 409, 410

Signs of maturity..... 61
Skin of new-born.....233
- in puerperium.....226, 241

Sources of infection.....447
Spermatozoids 21
- how reach ovum..... 23
- theories 23
- union with ovum..... 24

Sterilization 449
Structure of placenta..... 54
Symphysiotomy 430
- after treatment 433
- conditions 431
- indications 431
- preparation 431
- prognosis 433
- technique 432

Syncitium 31

T

Tears of clitoris....212
of vestibule....212
of perineum....208
degrees....208
treatment....210
Temperature in labor....118
in puerperium....224, 243
Testicle, anatomy....21
histology....21
Theories of labor....106
of menstruation....14, 16
Third stage....168
Transverse presentation....198
causes....198
clinical course....201
conduplicatio corpore....203
positions....199
prognosis....204
treatment....204
Twins....90, 193
causes....91
clinical course of labor....193
diagnosis....92
prognosis....195
treatment....195
Tying cord....166

U

Umbilical cord, anomalies....307
coiling....307
hernia....308
short....307
syphilis....308
torsion....308
true knots....308
velamentous insertion....308
Umbilical cord, prolapse of....416
causes....416
dangers....417
diagnosis....417
treatment....417, 419
Union of ovum and spermatozoid....22
Urea....59
Urine—
changes in labor....119
changes in pregnancy....49
examination of....100
of new-born....231
Uterine contractions in labor..110, 120
in pregnancy....77
Uterus—
ante-fixed....282
changes in menstruation....13
changes in pregnancy....36
displacements of....280
late in pregnancy....280
incarcerated....286
diagnosis....287
symptoms....287
treatment....288
posterior displacements....284
abortion from....285
causes....284
incomplete restitution....286
symptoms....285
terminations....285
ruptured....364
causes....365
diagnosis....367
signs....366
symptoms....366
treatment....367
sacciform dilatation....286
tetanus....325

V

Vagina....129
changes in....218
Vaginal douche....99
Version....404, 412
Braxton Hick's method....407, 410
conditions....411
preparation....411
cephalic....405, 412
conditions....412
indications....412
methods....405
pelvic....412
conditions....413
indications....412
podalic....406
indications....406, 414
in head presentation....414
methods....406, 407
Braxton Hick's....407, 410
Carl Braun....407
preparation....407
scapula dextra anterior....410
scapula dextra posterior....410
scapula laeva anterior....409
scapula laeva posterior....409
spontaneous....202
technique....408, 414
Vertex presentation—
forceps in....393, 395
Vestibule, tears in....212
Vicarious menstruation....20
Villi, primitive....31
Vitelline membrane....11
Vitellus....11

W

Weight of baby....9, 233

Z

Zona pellucida....12